



SwitchX®-2 60 Port Ethernet Switch System Hardware User Manual

P/N: MSX1024B-1BFS, MSX1024B-1BRS, MSX1024B-2BFS, MSX1024B-2BRS

Rev 1.1

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Revision History

Table 1 - Revision History Table

Date	Revision	Description
March 2013	1.1	Added SFP+ cable and module removal tool to contents. Added figures to appendix. Added note use only FCC compliant Ethernet cables. Added note concerning USB insertion Replaced wizard tables from MLNX-OS doc added section opening the CLI
January 2013	1.0	Initial Release

About this Manual

This manual describes the installation and basic use of the Mellanox switch which is based on the SwitchX®-2 switch device.

Intended Audience

This manual is intended for users and system administrators responsible for installing, running, and managing switch platforms.

The manual assumes familiarity with the Ethernet specification.

Related Documentation

Additional Documentation available from Mellanox:

Table 2 - Reference Documents and Web Sites

Document Name	Description
SwitchX®-2 Switch Hardware Installation Guide	The <i>Installation Guide</i> contains instructions for Installation in a rack and initialization of the switch platform. This document can be found on the product web page.
SwitchX®-2 Switch Product Hardware Release Notes	For possible hardware issues see the switch support product page. This document can be found on the support web page for this product. This requires a customer support login. Look up the relevant SwitchX®-based switch system/series release note file.
Mellanox MLNX-OS® Software User Manual	This document contains information regarding configuring and managing Mellanox Technologies Switch Platforms.
MLNX-OS® Software Command Reference Guide	Command Reference Guide for MLNX-OS® listing all of the commands available through MLNX-OS® with explanations and examples.

All of these documents can be found on the Mellanox Website at www.mellanox.com. They are available either through the product pages www.mellanox.com ⇒ Products ⇒ InfiniBand/VPI Switch Systems or through the support page with a login and password.

Conventions

Throughout this manual, the name SX1024 and the term switch are used to describe the 60 port SFP+/QSFP switch unless explicitly indicated otherwise.

The following icons are used throughout this document to indicate information that is important to the user.



This icon makes recommendations to the user.



This icon indicates information that is helpful to the user.



This icon indicates a situation that can potentially cause damage to hardware or software.



BEWARE! This icon indicates a situation that can potentially cause personal injury or damage to hardware or software.

Abbreviations

– Used to indicate a 4X port running at 56Gb/s

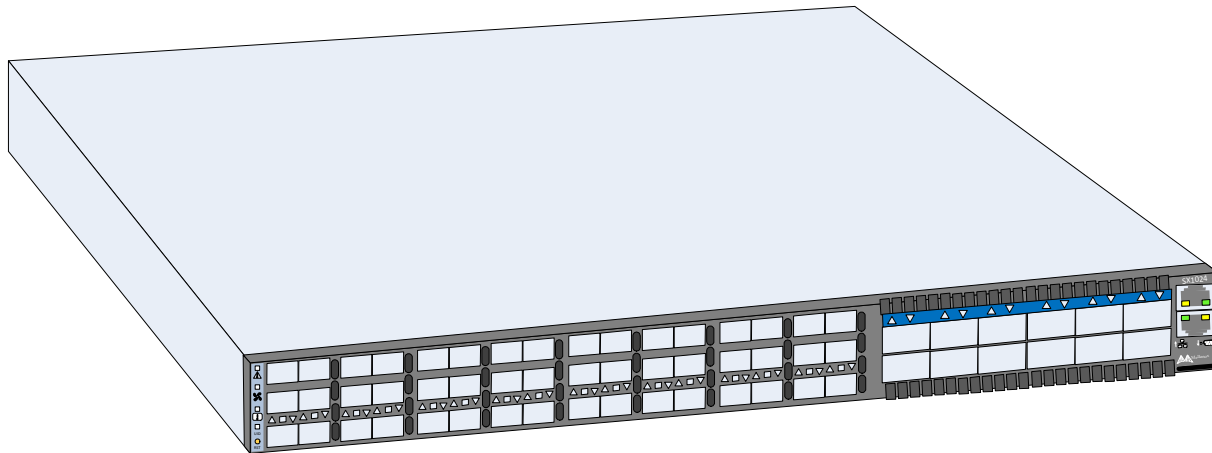
Mellanox Part Numbering Legend

Place	Field	Decoder
M		Mellanox Technologies
SX	System Type	SwitchX® switch Family
P	Data Transfer Protocol	1 = Ethernet
R	Size of box	0 = 1U 1 = 1.5U 2 = 2U
FF	40 Gb/s equivalent throughput	16 = 640Gb/s 24 = 960Gb/s 35 = 2880 Gb/s Light version of the Management software 36 = 2880 Gb/s
C	Data Rate	X = 10Gb/s Ethernet B = 40Gb/s Ethernet
-	Separator	
P	# Power Supplies	0=0, 1=1, 2=2....
M	Depth of the Unit	S = standard depth, B = short depth
Y	Air Flow direction	R= Connector side to Power side airflow F= Power Side side to Connector side airflow
R	Chip Generation	R – SwitchX S – SwitchX-2

1 Overview

The SX1024 Ethernet switch family provides the highest-performing fabric solution in a 1U form factor by delivering up to 1.152 Gb/s of non-blocking throughput to High-Performance Computing (HPC), high frequency trading and Enterprise Data Centers (EDC), with ultra-low latency. It has 48 10GbE ports that when connected to 10GbE based servers, provides a unique non-blocking solution for Ethernet Data-Centers.

Figure 1: Connector Side View of the Switch

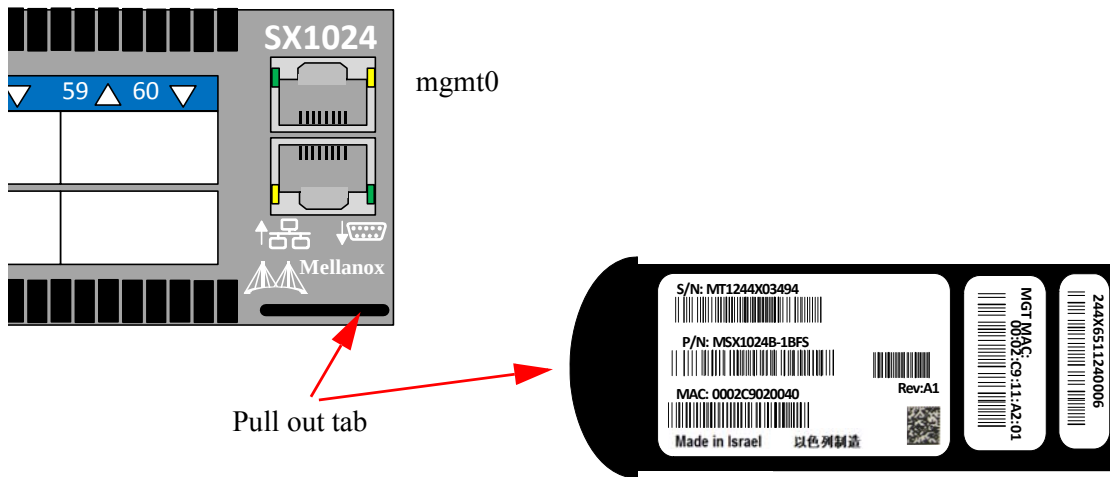


1.1 Features

- Based on Mellanox SwitchX-2
- Supports 48 SFP+ ports of 10 GbE
- Supports 12 QSFP ports of 40 GbE Upgradable with a license to 56 GbE
- 2x 10/100/1000BASE-T RJ-45 Ethernet port
- 1x RS232 RJ-45 Console connector
- 1x USB connector
- 1 + 1 redundant 300W AC/DC hot swappable Power supplies
- 3 + 1 redundant fans ordered in two fan units (Support Air in/out)
- On board Temperature monitoring
- Reset Push button on front panel
- Various status LEDs
- 19" rack mountable chassis, 1U with redundant power supplies and Fan units

1.2 Serial Number and Product Version Information

The serial number and the MAC for the switch are found on the pull out tab below the Mellanox logo on the right side of the Connector side panel. The MAC for the Management PC is also on this tab. This MAC is for the mgmt0 management interface (the top Ethernet port). The second interface mgmt1 has the next consecutive MAC. On this switch the mgmt1 interface is found on the power side on the left side.

Figure 2: Pull Out Tab

2 Ethernet Ports

This Ethernet switch system supports 48 SFP+ ports, 12 QSFP ports and maintains a 4:1 ratio. Each SFP+ port is capable of 10GbE/1GbE port speeds. Up to 24 SFP+ ports are capable of 1/2/4/8G FC. Ports 1-12 are grouped as FC ports as well as ports 38-48.

All Ethernet ports can be manually configured through the CLI management interface.



40 GbE and 56 GbE are only guaranteed to work with approved cables and modules.

Each of the 12 QSFP ports is capable of up to 40GbE, upgradable to 56 GbE with a license, as well as 10GbE with a QSA QSFP to SFP+ adapter or QSFP to SFP+ Mellanox cables.

Each of the 48 SFP+ ports is capable of up to 10GbE.

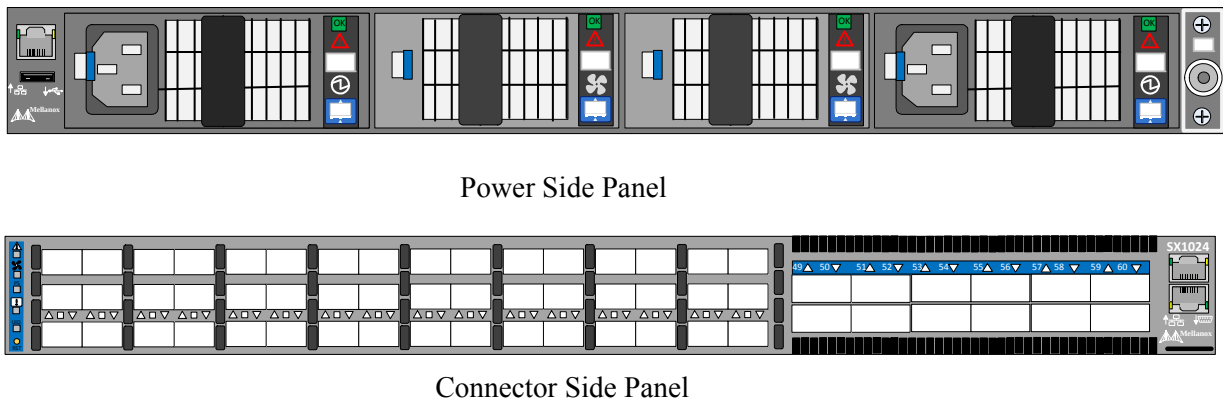
3 Basic Operation

3.1 Switch Platform Hardware Overview

Figure 3 shows the power side panel view of the switch. The figure shows the hot-swap power supply locations and the hot-swap fan modules, and an I2C banana connector.

The figure also shows the connector side panel views of the internally managed switch. The figure shows port configurations for the switch systems. Managed systems have 2 – Ethernet RJ-45 connectors for management, 1 – RJ-45 connector for connecting to a host PC, 1 – USB connector. All switches have various status LEDs for on site switch status information.

Figure 3: QSFP Switch System Power and Connector Side Panels

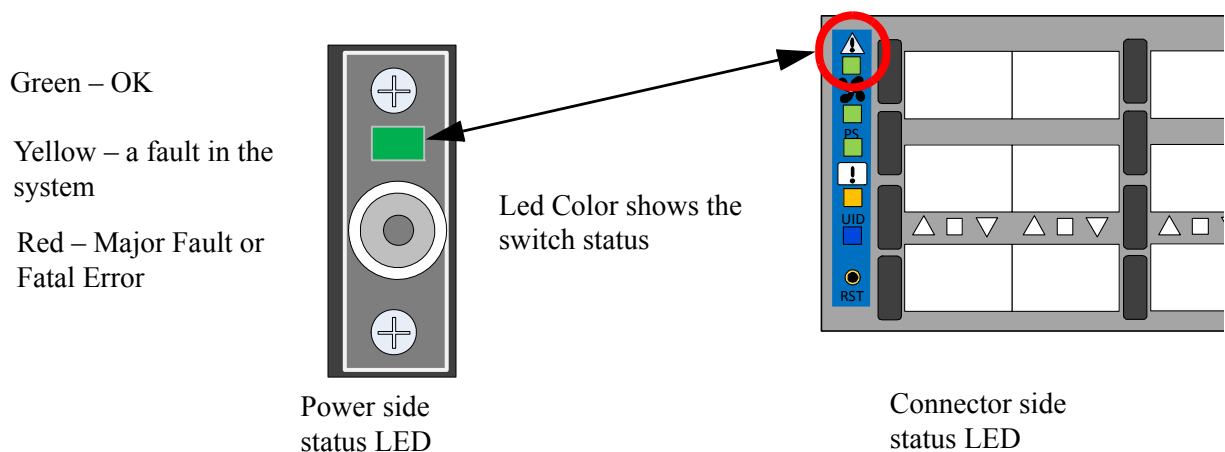


3.2 Status LEDs

3.2.1 System Status Indicators

The System Status Indicators are located to the left of the connectors on the connector side panel, and on the power side at the far right. Both of these LEDs give identical information.

Figure 4: System Status Indicators



The system status indicators should display as follows:

- when the switch is plugged in, within five minutes the STATUS LED should light up green
- the FAN LED should light up green. If the FAN LED shows red, troubleshoot the fan module. See “Troubleshooting” on page 52.



As long as there is power to the switch (one PS unit is connected), and the switch is booted up and running, the status LED should be green.



If the STATUS LED shows red after five minutes, unplug the switch and call your Mellanox representative for assistance.



If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 52.

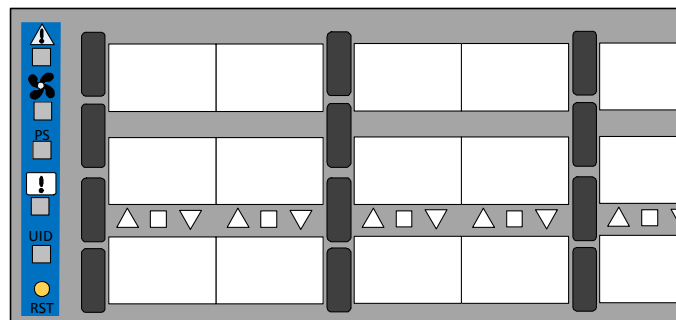


Table 3 shows the system status LED assignment.

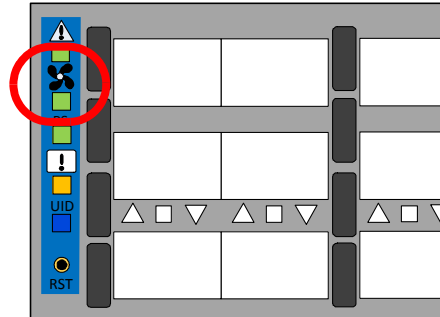
Table 3 - System Status LED Assignments

LED Configuration	STATUS/ System Health LED
Solid Green	OK – The system is up and running.
Flashing Green	The system is booting up. This assignment is valid on managed systems only.
Solid Yellow	To be implemented in a future SW release.
Solid Red	Major Error – Possible damage can result to the switch. Turn off immediately. e.g. bad firmware, can't boot, overheated. If the system is booting up, it can take up to 5 minutes for the status led to change to green.
Off	Off – The system has no power.

3.2.2 Fan Status Indicators

The indicator is located to the left of the connectors on the connector side panel.

Figure 5: Fan Status LED Connector Side



The LED indicator on the Fan Module is on the right side of the module.

Figure 6: Fan Status LED Power side

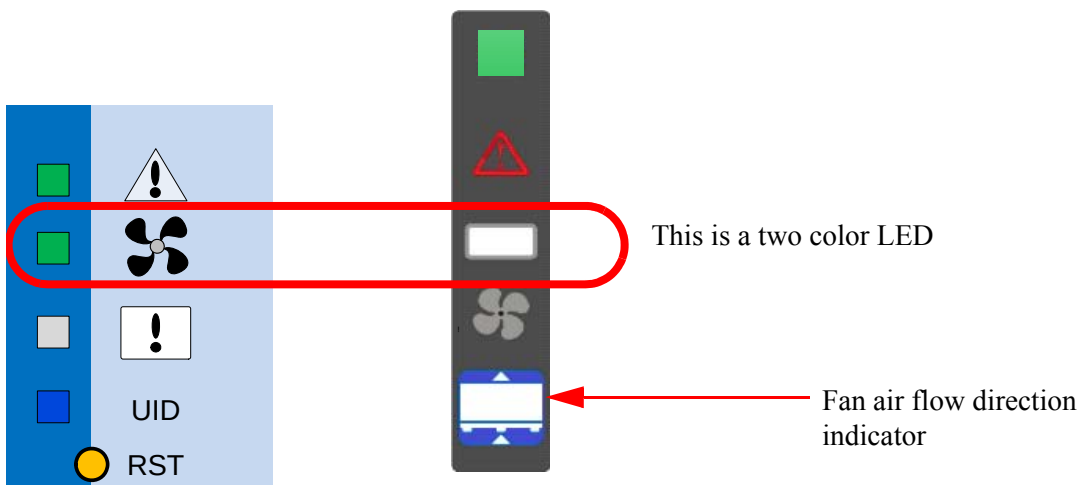


Table 4 shows the fan status LED assignment.

Table 4 - Fan Status LED Assignments

LED Configuration	FAN LED
Solid Green	OK – All fans are up and running.
Solid Red	Error – One or more fans is not operating properly. The system should be powered down and troubleshoot the fan module.
Off	Off – The fan unit is not receiving any power. Check that the fan unit is properly and completely inserted.



All fans must be operating while the power supply is plugged in.



If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 52.

3.2.3 Power Supply Status Indicators

The indicator is located to the left of the connectors on the connector side panel.

Figure 7: Power Status LED Connector Side

These are two color LEDs

Green — OK

Red — Major fault

Off — No power

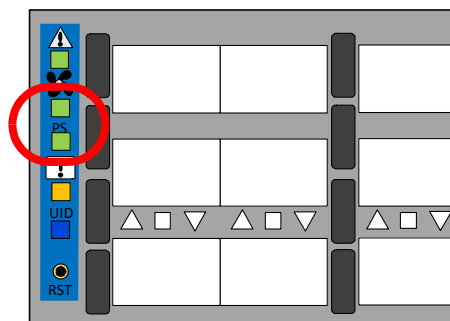
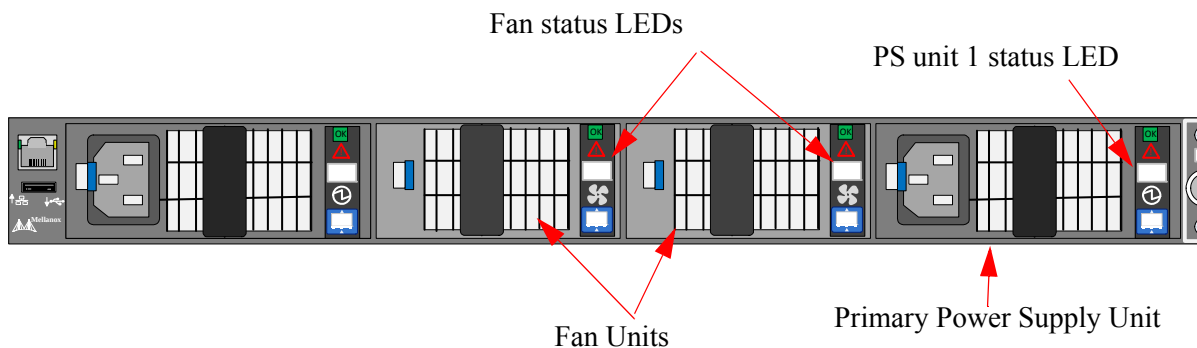


Figure 8: Power Side Panel



Each PS unit has a single 2 color LED on the right side of the PS unit, that indicates the internal status of the unit.

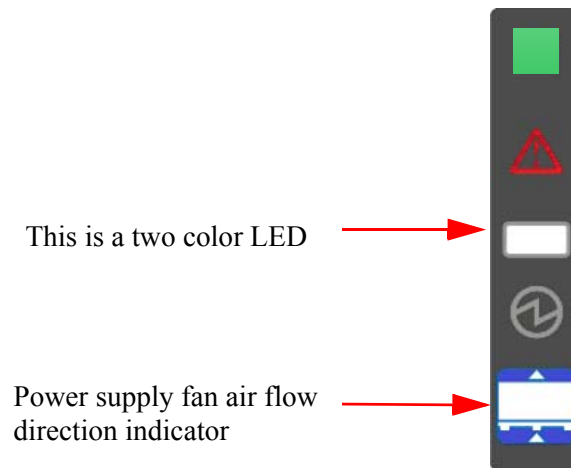
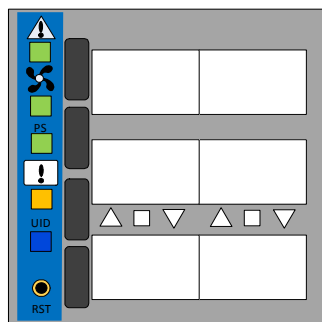
Figure 9: PS Unit Status LEDs

Table 5 shows the power supply unit status LED assignment.

Table 5 - PS Unit Status LED Assignments

LED Color	Status
Solid Green	OK – The Power supply is delivering the correct voltage – 12VDC.
Solid Red	Error – The PS unit is not operational.
Off	Off – There is no power to the system (neither PS unit is receiving power). If one PS unit is showing green and the second PS unit is unplugged it will show a red indication.

3.2.3.1 Bad Port LED

Figure 10: Bad Port LED

This is a one color LED
Flashing Orange — received symbol error

The Bad Port indicator is located on the left side of the connector side panel of the unit. Table 6 shows the fan status LED assignment.

Table 6 - Bad Port LED Assignments

LED Configuration	Description
Off	OK – No symbol errors have been received in last few seconds.
Flashing Orange	Error – One or possibly more ports have just received a symbol error Possible causes are: • Bad cable • Bad connection • Bad connector

This LED lights up when one or more ports is receiving a symbol error. The LED immediately goes off until the next symbol error is received.

3.2.3.2 UID LED Switch Identifier

The UID LED is a debug feature that lights a blue LED on the switch connector side panel for ease in finding a particular switch.

3.2.3.3 Port Connector LED Indicators

The SFP+ ports come three rows to a column. The LEDs refer to the ports according to the color coding in Figure 11.

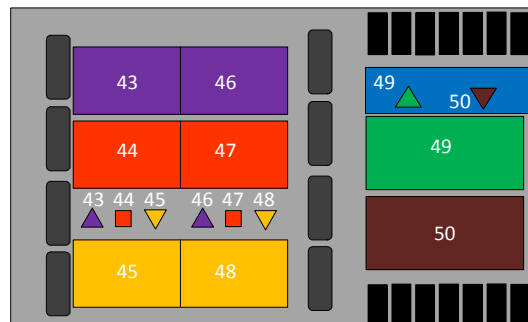
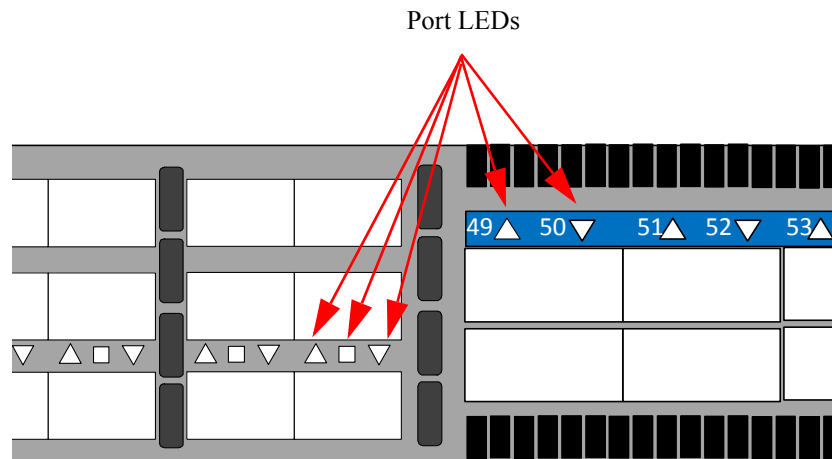
Figure 11: Port LED to Port Location Assignment

Figure 12: Port LEDs**Table 7 - Port Connector Physical and Logical Link Assignments for Ethernet**

LED Configuration	LED Description
Off	Physical link is down / Default.
Solid Green	Physical link is up with no traffic.
Flashing Green	Physical link is up with traffic.
Flashing Orange	Physical errors.

3.3 Air Flow

These switches can come with two air flow patterns. The two patterns are:

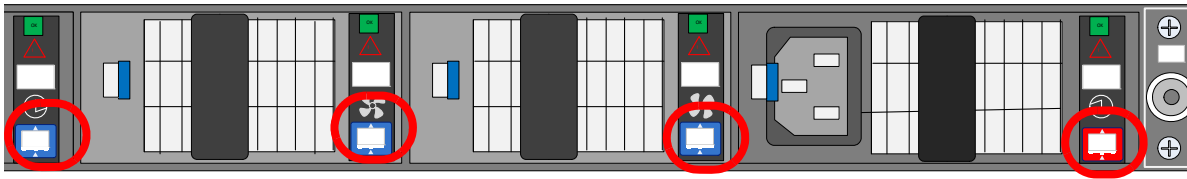
- Connector side inlet to power side outlet
- Power side inlet to connector side outlet

The air flow is specified in the product model number. See “Mellanox Part Numbering Legend” on page 10. On the PS unit and fan modules the air flow direction can be seen on the power side panel. All components need to have the same air flow. A mismatch in the air flow will affect the heat dissipation.



All PS units must have the same air flow as the fan modules.

Figure 13 shows a mismatch in component airflow.

Figure 13: Component Airflow Mismatch (Wrong)

All air flow labels must be the same.
Any mismatch of these labels will affect the switch temperature.

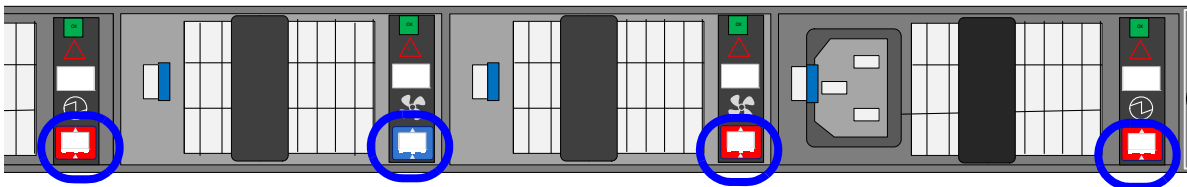
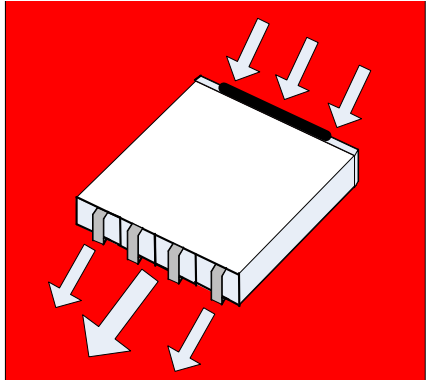
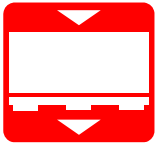
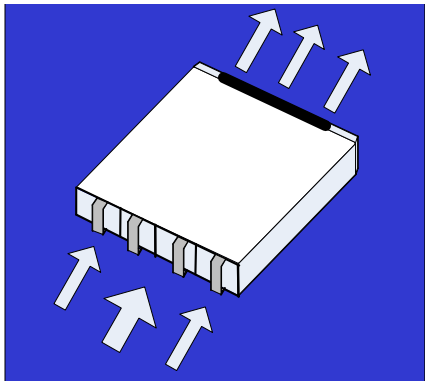


Table 8 shows the icons that indicate airflow using arrows and colors.

Table 8 - Air Flow Direction

Direction	Label	OPN Designation	Description
		R	Connector side inlet to power side outlet
		F	Power side inlet to connector side outlet



All components need the same colored airflow icons.

3.4 SFP+ Cable Power Budget Classification

All SwitchX®-2 SX10XX SFP+ switches are designed for active cables with a maximum power per module of 1.5W. Typical power per port is 1W.

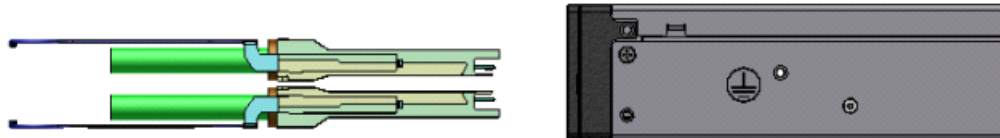
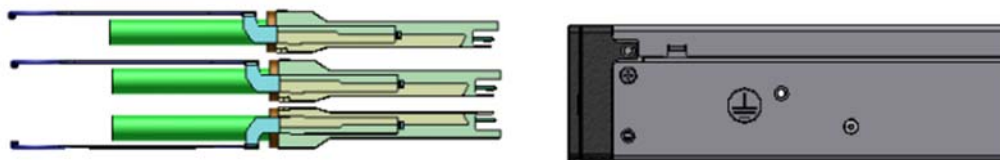
3.5 Interfaces

3.5.1 Port Connector Interfaces

There are 48 SFP+ ports and 12 QSFP ports. They are arranged according to the figure below.

Figure 14: Port Numbering

1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46	49	51	53	55	57	59
2	5	8	11	14	17	20	23	26	29	32	35	38	41	44	47						
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48						
																50	52	54	56	58	60

Figure 15: Top and Bottom QSFP Port Orientation**Figure 16: Top and Bottom SFP+ Port Orientation**

3.5.2 Port Speed Configuration

These SFP+ ports can be manually configured to run at speeds ranging from 1GbE to 10 GbE. These QSFP+ ports can be manually configured to run at speeds ranging from 10GbE to 56 GbE. To change the port speed configuration use the GUI, or use the CLI and go to the interface configuration mode, then use the command “speed”.

3.5.3 Management and Firmware Updating Interfaces

There are six interfaces to connect to the SX1024:

- 2 X 100M/1Gb Ethernet connectors labeled 
- 1 USB port that is labeled 
This interface can be used to update software or firmware.
- 1 connector that is labeled 
Use this connector to connect to the host PC.
- 1 reset button
- 1 I2C banana connector on the power supply side for FAE use only 

3.5.3.1 RJ-45 Connector

The port labeled  is for a local host connection to the management module. This is used the first time the switch is connected. A harness is included in the package to connect to a DB9 connection on a host PC. Connecting to a local host PC and following the instructions in the Installation Guide, “Configuring the Switch for the First Time”, must be done before any remote management is available. For the Socket pinout see “RJ-45 CONSOLE and I2C Interface” on page 63.

3.5.3.2 RJ-45 Ethernet Connector

The 2 Ethernet connections labeled  provide access for remote management. The switch can be connected to any Ethernet port. The Ethernet port on the connector side of the switch is mgmt0. The Ethernet port on the power side of the switch is mgmt1.



Each Ethernet connector gets connected to Ethernet switches. These switches must be configured to 100M/1G auto-negotiation.



Use only FCC compliant Ethernet cables.

3.5.3.3 USB Connector

There is a single USB connector. This connector can be used to install software and or firmware upgrades using a memory device that has a USB connector. This connector is USB 2.0 compliant.



USB 1.0 is not supported.



Do NOT use excessive force when inserting or extracting the USB from the connector.

3.5.3.4 I2C Connector

There is an I2C connector on the far right of the power side of the switch. **This interface is for Debug and Troubleshooting only.** This connector can be used to install firmware upgrades, should the firmware image be damaged and cannot be upgraded through a host PC or remotely. This interface is for support personnel and advanced users only.

3.5.4 Reset Button

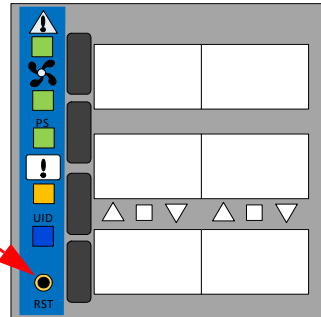
On the connector side panel under the system LEDs is a reset button. This reset button requires a tool to be pressed.



DO NOT use a sharp pointed object such as needle or push pin for pressing the Reset button. Sharp objects can cause damage, use a flat object to push the reset button.

Figure 17: Reset Button

Press the reset button to reset the main and management CPUs and to delete the existing password.



This button resets both the CPU of the switch device and the CPU of the management module. It thereby resets all of the ports by bringing them down and powering them up when the button is pushed. A quick push of this button performs this reset. When the button is held down for 15 seconds the switch is reset and the password is deleted. You will then be able to enter without a password and make a new password for the user “*admin*”.

4 Installation

Installation and initialization of the switch platform are straightforward processes, requiring attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

4.1 Installation Safety Warnings

For Safety Warnings in French see “Avertissements de sécurité d’installation (French)” on page 65, for German see “Installation - Sicherheitshinweise (German)” on page 69, and for Spanish see “Advertencias de seguridad para la instalación (Spanish)” on page 72.

1. Installation Instructions



Read all installation instructions before connecting the equipment to the power source.

2. Over-temperature



This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 45°C (113°F). Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

3. Restricted Access Location



This unit is intended for installation in a Restricted Access Location. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

4. Stacking the Chassis



The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.

5. Redundant Power Supply Connection - Electrical Hazard



This product includes a blank cover over the space for the redundant power supply. Do not operate the product if the blank cover is not securely fastened or if it is removed.

6. During Lightning - Electrical Hazard



During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

7. Copper Cable Connecting/Disconnecting



Copper cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings and instructions.

8. Rack Mounting and Servicing



When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

9. Equipment Installation



This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

10. Equipment Disposal



Disposal of this equipment should be in accordance to all national laws and regulations.

11. Local and National Electrical Codes



This equipment should be installed in compliance with local and national electrical codes.

12. Hazardous Radiation Exposure



Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.



CLASS 1 LASER PRODUCT and reference to the most recent laser standards:
IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001

13. UL Approved AC Power Cords



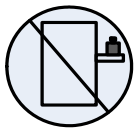
For North American power connection, select a power supply cord that is UL Listed and CSA Certified

3 - conductor, [18 AWG], terminated in a molded on plug cap rated at 125 V, [15 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m

For European connection, select a power supply cord that is internationally harmonized and marked “<HAR>”,

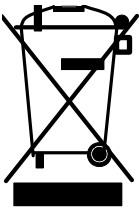
3 - conductor, minimum 0,75 mm² wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded on plug cap rated 250 V, 10 A.

14. Do Not Use the Switch as a Shelf or Work Space



Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space.

15. WEEE Directive



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

The switch platform can be rack mounted and is designed for installation in a standard 19” rack. The power side of the switch includes a hot-swap power supply module, a blank cover for an optional second PS unit for redundancy, and 2 hot-swap fan trays. There are two possible air flow directions. Be sure that the switch air flow direction is compatible with your system, rack, and PS units. The connector side of the switch has the ports, system LEDs, and management connection ports.

The switch platform contains auto-sensing 100 - 240 VAC connections for all possible PS units. The installer should use a rack capable of supporting the mechanical and environmental characteristics of a fully populated platform.



The rack mounting holes conform to the EIA-310 standard for 19-inch racks. Take precautions to guarantee proper ventilation in order to maintain good airflow at ambient temperature. Cable routing in particular should not impede the air exhaust from the chassis.

4.2 Installation Kits

There are two Installation kit options. One long and one short. Both the standard and the short switches can be mounted using the long rail kit.

Table 9 - Installation Kit According to Rack Size

Kit OPN	Rack Size
MSX60-BKIT	40-60 cm deep
MSX60-SKIT	60-80 cm deep

4.3 Package Contents

Before you install your new switch, unpack the system and check to make sure that all the parts have been sent, check this against the parts list below. Check the parts for visible damage that may have occurred during shipping.

The switch comes packed with the following items:

- 1 X – switch
- 1 X – installation kit
- 1X – power cable one for each PS unit – Type C13-C14
- 1 X – Harness
 - HAR000028 – Harness RS232 2M cable – DB9 to RJ-45
- 1 X – SFP+ cable and module removal tool
- 1 X – Quick Start Guide
- 1 X – China RoHS statement



If anything is damaged or missing, contact your customer representative immediately.
For customer support go to:
www.mellanox.com =>Support => Customer Support Portal Login

4.4 Mechanical Installation

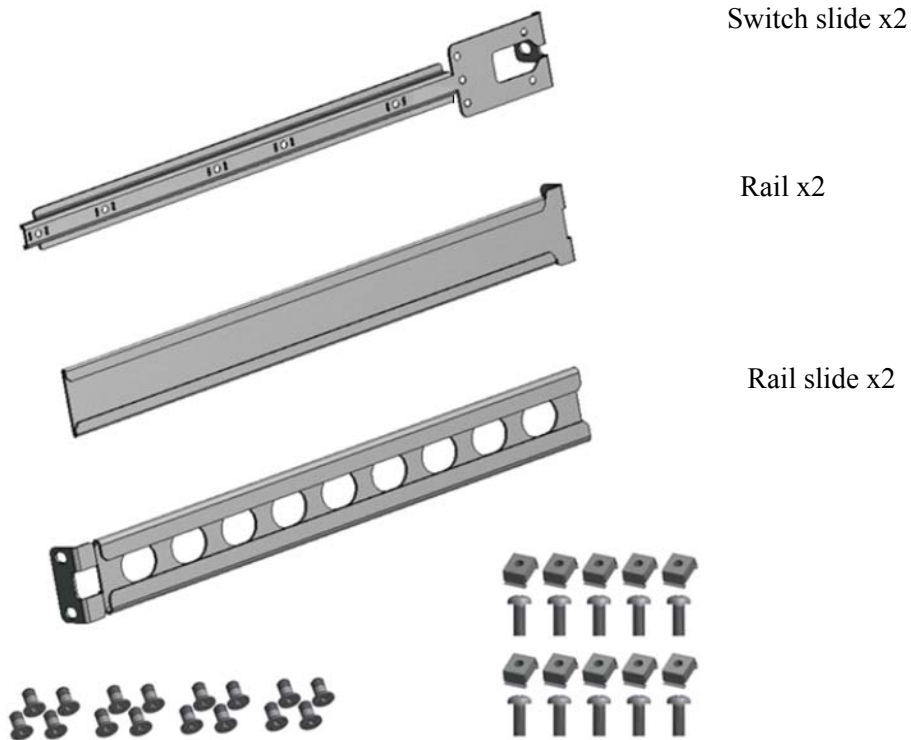
Tools and Customer Supplied Parts:

- Phillips Screwdrivers #1 and #2
- ESD strap
- ESD mat
- Grounding screw
- Grounding wire sufficient to reach a valid ground.

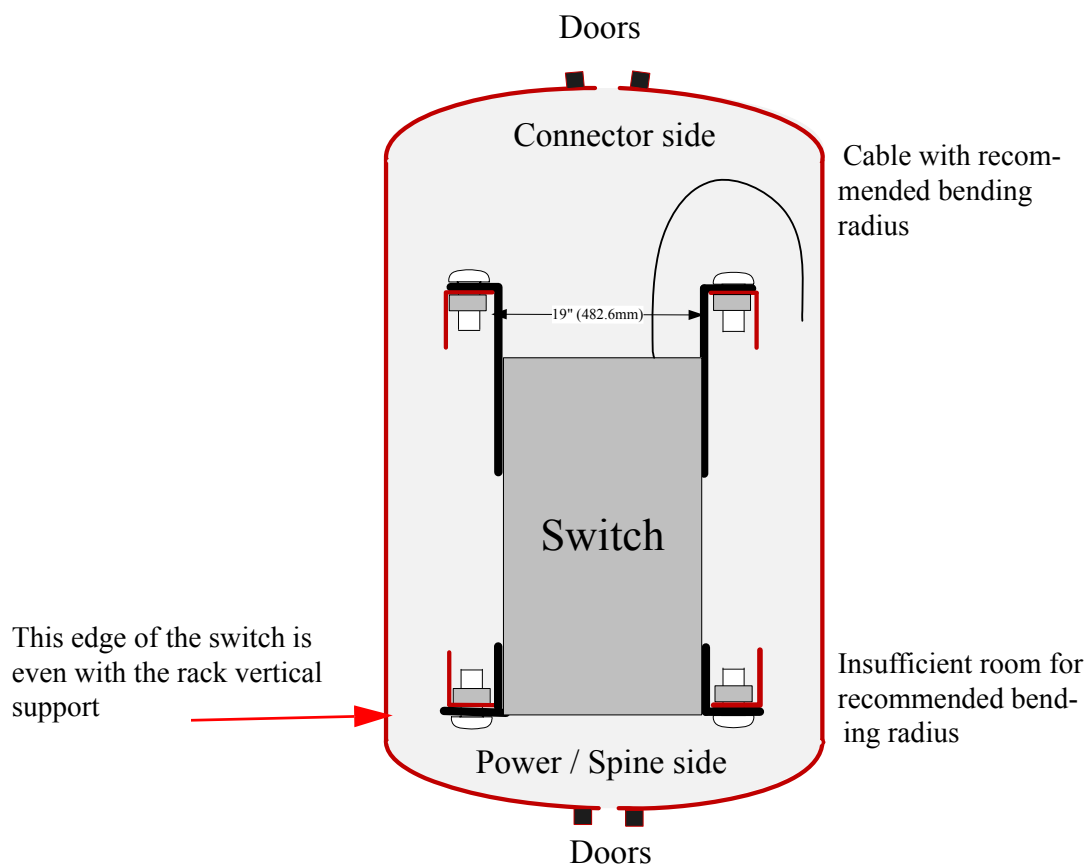
For racks from 60cm to 80cm deep either use the standard depth switches with the long rail kit or the short switches with the long rail kit.

Parts included in the rail kit:

- 2 rails
- 2 rail slides
- 2 switch slides
- 16 recessed flat head screws You will have extras!
- 10 caged nuts
- 10 pan head screws M6

Figure 18: Rack Rail Kit Parts

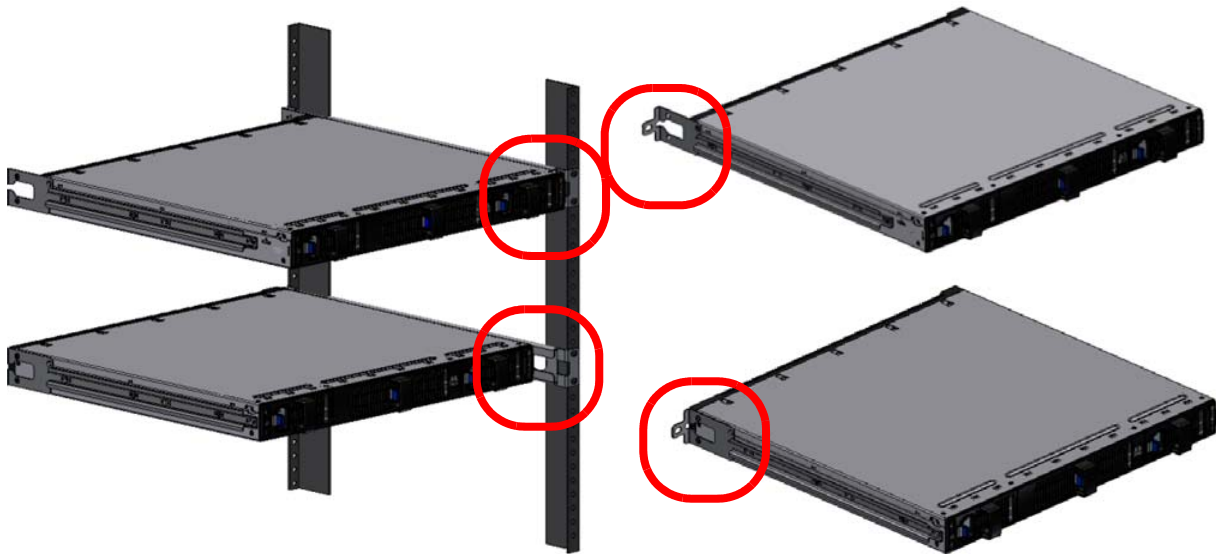
1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2. Choose which side of the switch you want even with the rack vertical support. Either the side with the power supply units or the side with the QSFP connectors can be even with one of the vertical rack supports.

Figure 19: Placement of Switch in Rack

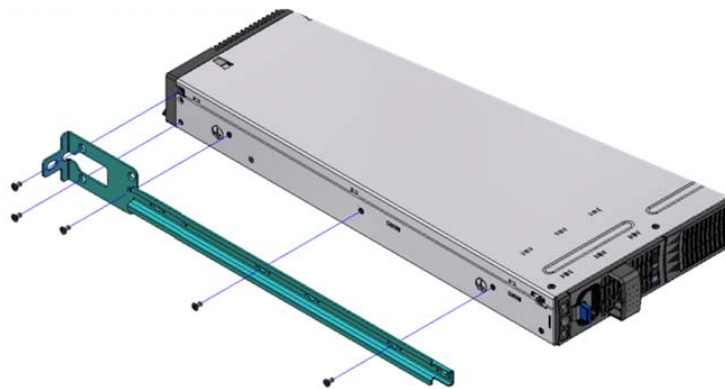
Consider the following when deciding where and how to mount the rails and rail slides:

The distance between the rack and the door can be as little as 1.57" (4 cm) on one side of the rack and as much as 7" (18 cm) on the other side of the rack. Keep in mind that there can be as many as 60 cables connected to the switch.

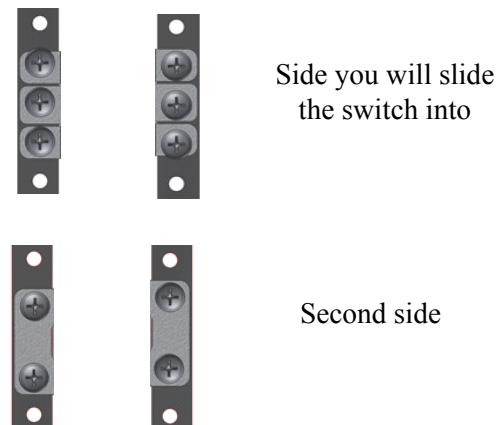
- Do you want the connector side recessed in the rack to allow for a larger cable bending radius? It is possible to recess the connector side by 2" (5cm) by optional placement of the switch rails. See Figure 20, "Mounting Options".
- Will the connector side be recessed past other equipment in the rack and will this be problematic?
- The installation kit allows for a 2" (5cm) recess of the switch past the vertical support.

Figure 20: Mounting Options

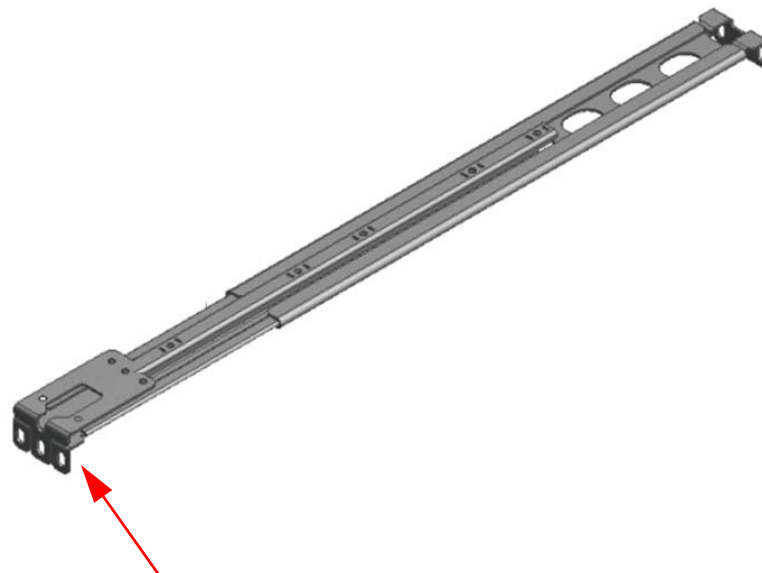
3. Decide which mounting option you want to use.
4. Screw the switch slides onto the switch. Use 5 flat head screws for short switches and 7 screws for standard depth switches, to connect each switch slide.

Figure 21: Screwing on the Rail

5 screws per side are needed for the short switch.
7 screws per side are needed for the standard switch.
There are 16 screws in the kit; you will have left over screws.

Figure 22: Inserting the Caged Nuts

5. Clip 6 caged nuts into the holes in the rack on the side of the rack you will be sliding the switch into. Check that both sides of the switch, power side and connector side, are at the same level in the rack.
6. Clip 4 more caged nuts into the holes on the opposite side of the rack. Check that both sides of the switch, left and right, are the same level in the rack.
7. Slide the rail into the rail slide.
8. Using two of the bolts for each corner install the rails and rail slides in the rack. Do not tighten the bolts yet.

Figure 23: Slide the Rail into the Rail Slide

This side of the rail kit goes on the side of the rack you will slide the switch into. This is the same side of the switch that will be next to the vertical support.

9. Slide the switch into the rails.
10. Tighten the bolts to 9.2 Nm or 81.5 pound inches.
11. Put the switch into place and screw the bolts into the nuts. Tighten the bolts to 9.2 Nm or 81.5 pound inches.
12. Ground the switch.
13. Plug in the power cables.
14. Check the Status LEDs and confirm that all of the LEDs show status lights consistent with normal operation.

Figure 24: Status LEDs 5 Minutes After Power On



Warning: Any yellow or red status LEDs are cause for concern and must be dealt with immediately.

It can take up to 5 minutes to boot up, during which time the status LED may indicate red.

15. You can start connecting all of the cables to the switch.

4.5 Grounding the Switch

Check to determine if your local or national electrical codes require an external ground to all IT components. If so, connect a ground wire to one of the casing screws and connect the other end to a valid ground. If you choose to not use the ground screw, make sure that the rack is properly grounded and that there is a valid ground connection between the chassis of the switch and the rack. Test the ground using an Ohm meter.



Some national and/or local codes may require IT components to be bonded and externally grounded (not including the power cord ground). You must follow all national and local codes when installing this equipment.

4.6 Power Connections and Initial Power On

The switch platform ships with one or two power supply units. For switches with only one unit installed, a second PS unit may be installed at a later time. Each supply has a separate AC recep-

tacle. The input voltage is auto-adjusting for 100 - 240VAC, 50-60Hz power connections. The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.



Caution: The switch platform will automatically power on when AC power is applied. There is no power switch. Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.



This unit is intended for installation in a Restricted Access Location. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.



Caution: After inserting a power cable and confirming the green system status LED light is on; make sure that the Fan Status indicator shows green. If the fan status indicator is not green then unplug the power connection and check that the fan module is inserted properly and that the mating connector of the fan unit is free of any dirt and/or obstacles.



Caution: When turning off the switch, make sure ALL Connector LEDs are off to ensure a powered down status.



Do not hot swap the power supply if your switch has only one power supply. You must power down the system to replace the power supply unit when there is only one PS unit in the switch.

Figure 25: Two Power Inlets - Electric Caution Notifications

CAUTION

Risk of electric shock and energy hazard. The two PS units are independent.

Disconnect all power supplies to ensure a powered down state inside of the switch platform.

ACHTUNG

Gefahr des elektrischen Schocks. Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen sind die Netzstecker aller Netzteile zu entfernen

ATTENTION

Risque de choc et de danger électriques. Le débranchement d'une seule alimentation stabilisée ne débranchera uniquement qu'un module "Alimentation Stabilisée". Pour isoler complètement le module en cause, Il faut débrancher toutes les alimentations stabilisées.

4.7 Battery Replacement

Mellanox Technologies does not support battery replacement. Customer removal of the switch cover will void the warranty. Only Remove the cover to comply with WEEE directives or to disassemble for environmentally approved disposal.



Customer removal of the switch cover will void the warrantee.

4.8 Configuring the Switch the First Time

The procedures described in this chapter assume that you have already installed and powered-on your switch according to the instructions in this document.

4.9 Managed (Internally Managed) Switches

Internally managed switches, must be configured before they will work. Follow the procedures below to configure the switch.

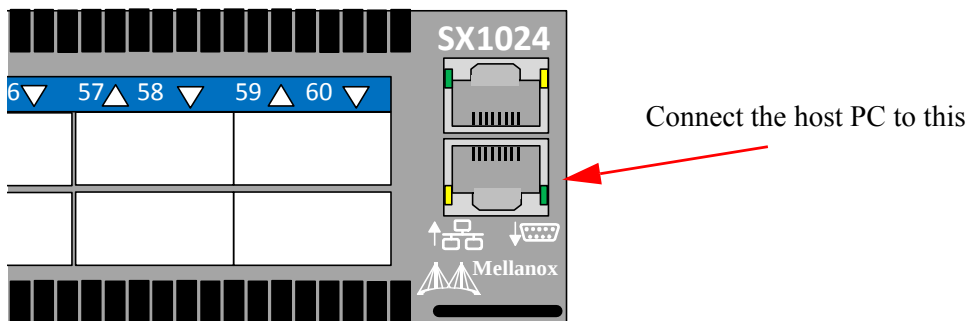
➤ *To configure the switch:*



Externally managed switches do not get configured. The CONSOLE, Ethernet, and USB connectors are not found on externally managed switches. Instead there is an I2C connector.

1. Connect the host PC to the Console (RJ-45) port of the switch system using the supplied cable. The Console ports for systems are shown below as examples.

Figure 26: Console Port



Make sure to connect to the Console RJ-45 port of the switch and not to the (Ethernet) MGT port.



No remote IP connection is available at this stage.

2. Configure a serial terminal program (for example, HyperTerminal, minicom, or Tera Term) on your host PC with the settings described in [Table 10](#).

Table 10 - Serial Terminal Program Configuration

Parameter	Setting
Baud Rate	9600
Data bits	8
Stop bits	1
Parity	None
Flow Control	None

3. Login (from a serial terminal program) as *admin* and use *admin* as password. This starts the Mellanox configuration wizard.
4. Go through the Mellanox configuration wizard. Table 11 shows an example of a wizard session.

Table 11 - Configuration Wizard Session - IP Configuration by DHCP (Sheet 1 of 2)

Wizard Session Display (Example)	Comments
Mellanox configuration wizard Do you want to use the wizard for initial configuration? yes	You must perform this configuration the first time you operate the switch or after resetting the switch. Type 'y' and then press <Enter>.
Step1: Hostname? [switch-1]	If you wish to accept the default hostname, then press <Enter>. Otherwise, type a different hostname and press <Enter>.
Step 2: Use DHCP on mgmt0 interface? [no]	Perform this step to obtain an IP address for the switch. (eth0 is the management port of the switch.) If you wish the DHCP server to assign the IP address, type 'yes' and press <Enter>. If you type 'no' (no DHCP), then you will be asked whether you wish to use the 'zeroconf' configuration or not. If you enter 'yes' (yes Zeroconf), the session will continue as shown in Table 12. If you enter 'no' (no Zeroconf), then you need to enter a <i>static</i> IP, and the session will continue as shown in Table 13.
Step 3: Enable IPv6? [yes] yes	The management interface will be able to use IPv6 addresses.
Step 4: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no] no	This turns on autoconfiguration of the IPv6 addresses. This is unsuitable for DHCPv6.

Table 11 - Configuration Wizard Session - IP Configuration by DHCP (Sheet 2 of 2)

Wizard Session Display (Example)	Comments
Step 5: Admin password (Press <Enter> to leave unchanged)? <new_password> Step 6: Confirm admin password? <new_password>	To avoid illegal access to the machine, please type a password and then press <Enter>. Then confirm the password by re-entering it. Note that password characters are <i>not</i> printed.
You have entered the following information: 1. Hostname: <switch name> 2. Use DHCP on mgmt0 interface: yes 3. Enable IPv6: yes 4. Enable IPv6 autoconfig (SLAAC) on mgmt0 interface: no 5. Admin password (Enter to leave unchanged): (CHANGED) To change an answer, enter the step number to return to. Otherwise hit <enter> to save changes and exit. Choice: <Enter> Configuration changes saved. To return to the wizard from the CLI, enter the “configuration jump-start” command from configuration mode. Launching CLI... <switch name>	The wizard displays a summary of your choices and then asks you to confirm the choices or to re-edit them. Either press <Enter> to save changes and exit, or enter the configuration step number that you wish to return to. Note: To run the command “configuration jump-start” you must be in Config mode.

Table 12 - Configuration Wizard Session - IP Zeroconf Configuration

Wizard Session Display - IP Zeroconf Configuration (Example)
Mellanox configuration wizard Do you want to use the wizard for initial configuration? y Step 1: Hostname? [switch-112126] Step 2: Use DHCP on mgmt0 interface? [no] Step 3: Use zeroconf on mgmt0 interface? [no] yes Step 4: Default gateway? [192.168.10.1] Step 5: Primary DNS server? Step 6: Domain name? Step 7: Enable IPv6? [yes] yes Step 8: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no] no Step 9: Admin password (Enter to leave unchanged)? You have entered the following information: 1. Hostname: switch-112126 2. Use DHCP on mgmt0 interface: no 3. Use zeroconf on mgmt0 interface: yes 4. Default gateway: 192.168.10.1 5. Primary DNS server: 6. Domain name: 7. Enable IPv6: yes 8. Enable IPv6 autoconfig (SLAAC) on mgmt0 interface: yes 9. Admin password (Enter to leave unchanged): (unchanged) To change an answer, enter the step number to return to. Otherwise hit <enter> to save changes and exit. Choice: Configuration changes saved. To return to the wizard from the CLI, enter the "configuration jump-start" command from configure mode. Launching CLI... <switch name> [standalone: master] >

Table 13 - Configuration Wizard Session - Static IP Configuration

Wizard Session Display - Static IP Configuration (Example)
Mellanox configuration wizard Do you want to use the wizard for initial configuration? y Step 1: Hostname? [switch-112126] Step 2: Use DHCP on mgmt0 interface? [yes] n Step 3: Use zeroconf on mgmt0 interface? [no] Step 4: Primary IP address? 192.168.10.4 Mask length may not be zero if address is not zero (interface mgmt0) Step 5: Netmask? [0.0.0.0] 255.255.255.0 Step 6: Default gateway? 192.168.10.1 Step 7: Primary DNS server? Step 8: Domain name? Step 9: Enable IPv6? [yes] yes Step 10: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no] no Step 11: Admin password (Enter to leave unchanged)? You have entered the following information: 1. Hostname: switch-112126 2. Use DHCP on mgmt0 interface: no 3. Use zeroconf on mgmt0 interface: no 4. Primary IP address: 192.168.10.4 5. Netmask: 255.255.255.0 6. Default gateway: 192.168.10.1 7. Primary DNS server: 8. Domain name: 9. Enable IPv6: yes 10. Enable IPv6 autoconfig (SLAAC) on mgmt0 interface: no 11. Admin password (Enter to leave unchanged): (unchanged) To change an answer, enter the step number to return to. Otherwise hit <enter> to save changes and exit. Choice: Configuration changes saved. To return to the wizard from the CLI, enter the "configuration jump-start" command from configure mode. Launching CLI... <switch name>[standalone: master] >

5. Before attempting a remote (for example, SSH) connection to the switch, check the mgmt0 interface configuration. Specifically, verify the existence of an IP address. To check the current mgmt0 configuration, enter the following commands:

```

sx-43 [standalone: master] > enable
sx-43 [standalone: master] # configure terminal
sx-43 [standalone: master] (config) # show interfaces mgmt0

```

The following is an example of the output:

```

Interface mgmt0 state
  Admin up:          yes
  Link up:           yes
  IP address:        192.168.10.43
  Netmask:           255.255.255.0
  Speed:             1000Mb/s (auto)
  Duplex:            full (auto)
  Interface type:    ethernet
  Interface source:  physical
  MTU:               1500
  HW address:        00:02:C9:11:2A:AE
  Comment:

RX bytes:           1343502058      TX bytes:           313920869
RX packets:          17589211      TX packets:          992717
      RX mcast packets:      0      TX discards:          0
RX discards:         0      TX errors:           0
RX errors:           0      TX overruns:         0
RX overruns:         0      TX carrier:          0
RX frame:            0      TX collisions:       0
                        TX queue len: 1000

```



For managed switches, confirm that the latest SW revision is installed on this device. Use the CLI to get the currently installed revision and then go to Mellanox.com to check the revision of the latest version.

6. Run the command:

```
show version
```

7. Compare the results of this command with the latest version for your switch posted on the [support page for your switch](#). This page will need a support login and password.

➤ **Starting the Command Line (CLI)**

1. Set up an Ethernet connection between the switch and a local network machine using a standard RJ-45 connector.
2. Start a remote secured shell (SSH) to the switch using the command “ssh -l <username> <switch ip address>.”

```
rem_mach1 > ssh -l <username> <ip address>
```

```
Mellanox MLNX-OS Switch Management

Last login: Thu Apr 28 11:24:13 2011 from 192.168.10.1
Mellanox Switch

switch >
```

3. Login to the switch (default username is *admin*, password *admin*)
4. Once you get the prompt, you are ready to use the system. Refer to *MLNX-OS Command Reference Guide* for additional information on the CLI commands.

4.10 Rerunning the Wizard

If you want to rerun the wizard run the following commands:

```
sx-43 [standalone: master] > enable
sx-43 [standalone: master]# configure terminal
sx-43 [standalone: master] (config) # configuration jump-start
```

4.11 Connecting to the Switch Platform

4.11.1 Starting a Remote Connection to the Switch

There are two ways to access the management CPU:

- Via the Ethernet connector for remote access:
 - SSH
 - Telnet
 - Web
 - SNMP
 - XML
- Via KVM connections locally

4.12 Starting an SSH Connection to the Switch (CLI)

1. Set up an Ethernet connection between the switch and a local network machine (“the remote machine” henceforth) using a standard RJ-45 connector.
2. Connect to the remote machine (*rem_mach1* is used as an example).
3. Start a remote shell to the switch using the following command using *<switch_IP_address>* is the IP address of the switch.

```
rem_mach1 > ssh -l <username> <switch ip address>
Mellanox MLNX-OS® Switch Management
Password:
Last login: March 13, 2013 from 192.168.10.1
Mellanox Switch
sx-43 [standalone: master] >
```

4. You can enter any supported command now.

5 Extracting and Inserting FRUs

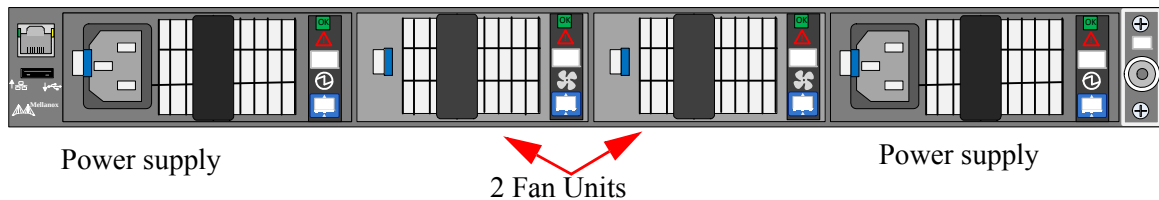
5.1 Extracting and Inserting the Power Supply Unit

With both power supplies installed in the redundant configuration, either PS unit may be extracted without bringing down the system.



Make sure that the PS unit that you are NOT replacing is showing all green, for both the PS unit and status indicators.

Figure 27: Fan and PS unit Air Flow Direction

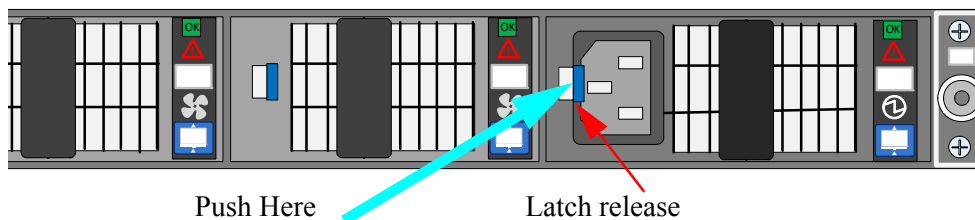


See Section 3.3 on page 20 for more information on air flow direction.

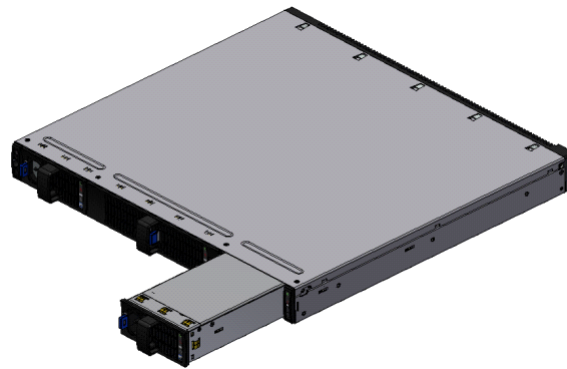


Power supply units have directional air flows similar to the fan module. The Fan module airflow must coincide with the airflow of all of the PS units. If the PS unit airflow direction is different from the fan module airflow direction the switch internal temperature will be affected.

Figure 28: Power Supply Unit Extraction



If you are not immediately installing a new PSU you must install a blank so that the air flow for cooling the switch is not compromised.

Figure 29: PS Unit Pulled Out

➤ **To extract a PS unit:**

1. Remove the power cord from the power supply unit.
2. Grasping the handle with your right hand, push the latch release with your thumb while pulling the handle outward. As the PS unit unseats, the PS unit status indicators will turn off.
3. Remove the PS unit.

➤ **To insert a PS unit:**

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.



Do not attempt to insert a PS unit with a power cord connected to it.

2. Insert the PS unit by sliding it into the opening until a slight resistance is felt.
3. Continue pressing the PS unit until it seats completely. The latch will snap into place confirming the proper installation.
4. Insert the power cord into the supply connector.
5. Insert the other end of the power cord into an outlet of the correct voltage.



The green PS unit indicator should light. If not, repeat the whole procedure to extract the PS unit and re-insert it.

5.2 Extracting and Inserting the Fan Units

This switch can operate indefinitely with less than a full compliment of fans in the fan modules operating properly so long as the ambient temperature is below 45° Celsius. This switch has two fan modules. Each fan module has two integral fans.



This unit is intended for installation in a Restricted Access Location. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

**Risk of Electric Shock!**

With the fan module removed power pins are accessible within the module cavity.
DO NOT insert tools or body parts into the fan module cavity.



Operation without a fan unit should not exceed two minutes.

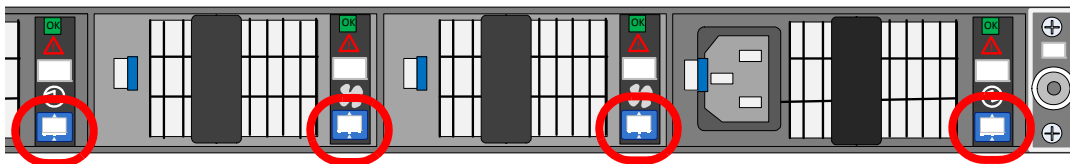
During fan hot-swap, if the LED indicator is OFF then the fan unit is disconnected.

There are two possible air flows for the fan unit. The air flow depends on the switch model. See “Air Flow” on page 20 for an explanation of the model numbers and labels.



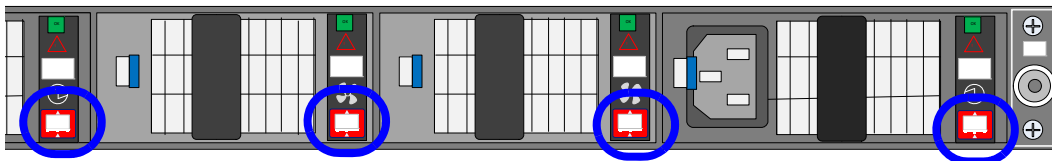
Make sure that the fans have the air flow that matches the model number. An air flow opposite to the switch design will cause the switch to operate at a higher (less than optimal) temperature.

Figure 30: Air Flow Labels



These air flow labels must be the same.

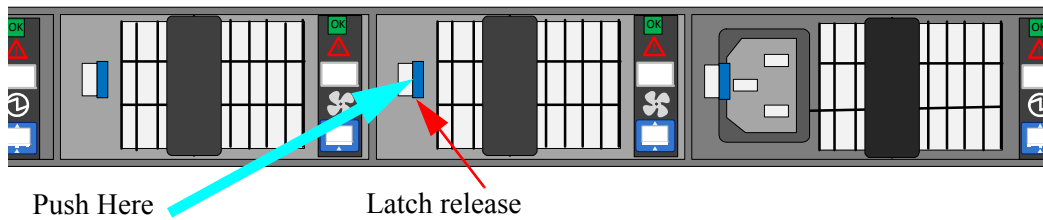
Blue is power side inlet to connector side outlet



Red is connector side inlet to power side outlet

➤ **To extract a Fan Unit:**

1. Grasping the handle with your right hand, push the latch release with your thumb while pulling the handle outward. As the fan unit unseats, the fan unit status indicators will turn off.
2. Remove the fan unit.

Figure 31: Fan Module Latches

➤ **To insert a FAN Unit:**

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
2. Insert the fan unit by sliding it into the opening until slight resistance is felt. Continue pressing the fan unit until it seats completely.



The green fan status indicator should light. If not, extract the fan unit and reinsert it. After two unsuccessful attempts to install the fan unit, power off the switch before attempting any system debug.

6 Cabling

6.1 Splitting the Data Stream Using Breakout (Fanout) Cables

Specific ports can be split by using a QSFP 1X4 breakout cable to split one 40 GbE port into 4 lanes (4 SFP+ connectors 10GbE each). These 4 lanes then go, one lane to each of the 4 SFP+ connectors.

Figure 32: Breakout or Fanout Cable

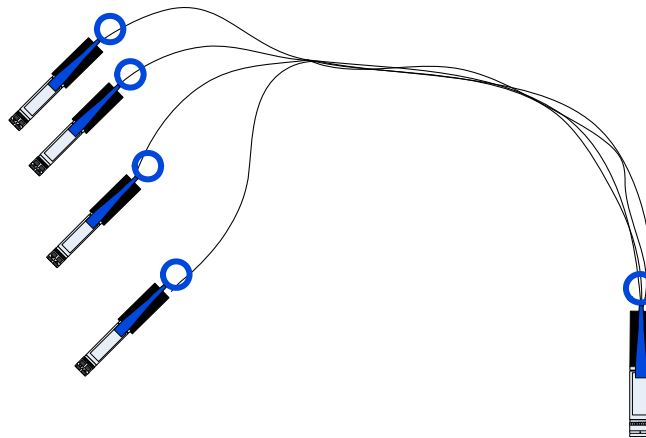


Figure 33: Port Splitting Options

7	10	13	16	19	22	25	28	31	34	37	40	43	46	49	51	53	55	57	59
8	11	14	17	20	23	26	29	32	35	38	41	44	47					×	
9	12	15	18	21	24	27	30	33	36	39	42	45	48					×	
														50	52	54	56	58	60



This port can be split into 4 10Gb/s SFP+



This port is unmapped according to the Port Splitting Table

The maximum 10 Gb/s Ethernet ports configurable with this switch is 64.

When using a port to split a data stream into 4-10Gb/s data streams (four lanes) one of the other ports on the switch will be disabled (unmapped). When using this feature you **MUST** go into the MLNX-OS® chassis management system and reconfigure the individual ports to split -4. See the MLNX-OS® Software Command Reference Guide for instructions on port configuration.

6.2 Cable Installation



56Gb/s and 40Gb/s are only guaranteed to work with approved Mellanox Cables.

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The LED indicator, corresponding to each data port, will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When a logical connection is made the LED will change to green. When data is being transferred the light will blink green.

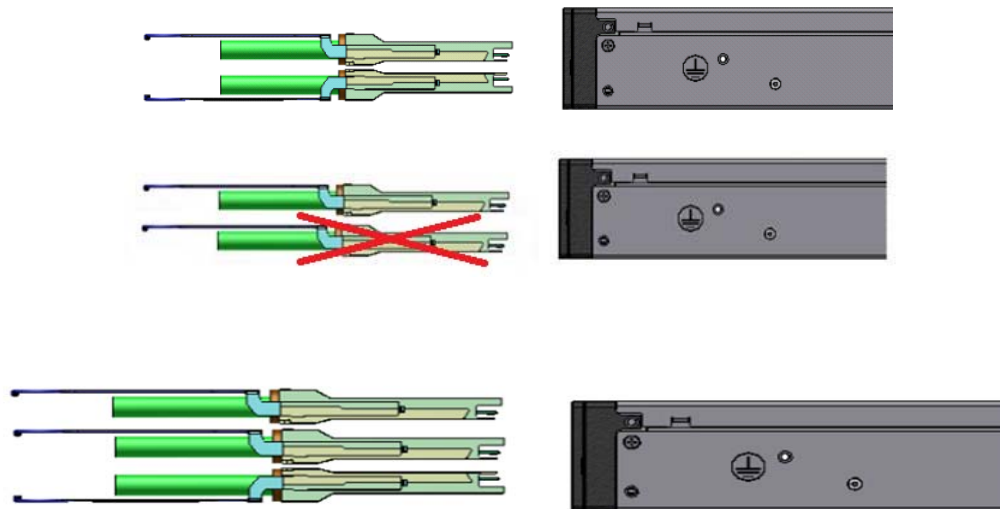


Do not force the cable into the cage with more than 40 newtons / 9.0 pounds force / 4 kg force. Greater insertion force may cause damage to the cable or the cage.



Cables in the bottom row should be inserted up side down in relation to the how the cables are inserted in the top row.

Figure 34: SFP+ Cable Orientation



To remove, disengage the locks and slowly pull the connector away from the port receptacle. The LED indicator for that port will turn off when the cable is unseated.

Care should be taken not to impede the air flow through the ventilation holes next to the connector ports. Cable lengths should be used which allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.

7 Switch Shut Down Procedure

To shut down the switch run the command:

```
Reload halt [noconfirm]
```



The switch cannot be restarted remotely!

To restart the switch you must physically go to the switch and unplug and plug in the power cord.

8 Disassembly of the Switch from the Rack

➤ *To disassemble the switch from the rack:*

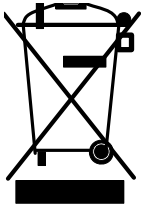
1. Unplug and remove all connectors.
2. Unplug all power cords.
3. Remove the ground wire.
4. Unscrew the 2 center bolts from the side of the switch with the bracket.



Support the weight of the switch when you remove the screws so that the switch does not fall.

5. Slide the switch from the rack.
6. Remove the rail slides from the rack.
7. Remove the ten caged nuts.

8.1 Disposal



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

Follow the instructions found in the Mellanox Web site at mellanox.com for proper instructions to disassemble and dispose of the Switch according to the WEEE directive.

This button resets both the CPU of the switch device and the CPU of the management module. It

Press the reset button to reset the main CPU and the management CPU and to delete the existing password.



thereby resets all of the ports by bringing them down and powering them up when the button is pushed. A quick push of this button performs this reset. When the button is held down for 15 sec-

onds the switch is reset and the password is deleted. You will then be able to enter without a password and make a new password for the user “*admin*”.

You will need the MLNX-OS® package or Mellanox to update firmware for this switch. The MLNX-OS® package can be downloaded from:

<http://www.mellanox.com> => Products > Management Software > MLNX-OS.

The Mellanox UFM Management software is also an option to more closely manage your fabric, switches and nodes.

The switch can be managed either remotely, or Out-of-Band using MLNX-OS.

The SX10XX switches come standard with a management software module for chassis management called Mellanox Operating System (MLNX-OS). MLNX-OS® is installed on all based managed switch systems. MLNX-OS® includes a CLI, chassis management software



The Ethernet ports for remote management connect to Ethernet switches. These switches must be configured to 100M/1G auto-negotiation.

8.2 Upgrading Software

Software and firmware updates are available from the Mellanox Support website. Copy the update to a known location on a Remote server within the user’s LAN.

Use the CLI in order to perform software upgrades. For further information please refer to the the MLNX-OS Software User Manual section Upgrading MLNX-OS® Software.

Be sure to read and follow all of the instructions regarding the updating of the software on your switch system.

9 Troubleshooting

As soon as a switch is plugged in make sure that the green power LEDs on the PS units are on.

Issue 1. Status LED and or Status Health LED:

If either of these two LEDs is **red** unplug the switch and call your Mellanox representative.

Issue 2. Power supply unit:

If the LED on the PS unit is not lit or is red, check that the power cable is plugged into a working outlet.

1. Check that the power cable has a voltage within the range of 100 - 240 volts AC.
2. Check that the air flow direction of the PS units are consistent with the Fan module air flow.
3. Remove and reinstall the power cable.
4. Remove and reinstall the PS unit.

Issue 3. The power LED for the switch shuts off:

1. Check that there is adequate ventilation. Are the fan LEDs showing that the fans are all up and running?
2. Make sure that there is nothing blocking the front or rear of the chassis and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
3. If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.

Issue 4. The green power LED for the fans does not come on:

1. Check that the Power LEDs are on.
2. Remove and reinstall the fan unit. Make sure the mating connector of the new unit is free of any dirt and/or obstacles. See Section 7, "Switch Shut Down Procedure," on page 49.
3. Check that the mating connector pins are not bent.



Do not run the switch if the System Status LED for the Fans is Red!

Issue 5. The link LED for the connector does not come on:

1. Check that both ends of the cable are connected.
2. Check that the locks on the ends are secured.
3. Make sure that the latest firmware version is installed on all of the HCA cards and the switch.
4. If media adapters are used, check that the all connections are good, tight, and secure.

Issue 6. The activity LED does not come on:

When running IB check that the Subnet Manager has been started.

Issue 7. The switch is off:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.

5. If the switch comes on, Use the MLNX-OS® management CLI to determine the cause of the Shutdown.
6. Check the temperature.
7. Check the Fan status.

Issue 8. The switch is not working and unresponsive:

1. Reset the switch.

If resetting the switch does not work:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, use the MLNX-OS® management CLI to determine the cause of the shutdown.

Issue 9. The last software update did not succeed:

1. Connect the RS232 connector (CONSOLE) to a laptop.
2. Push the reset button on the switch or management module.
3. You will have ~ 5 seconds to stop the U-Boot by pressing Control-B.
4. Choose the image to upload. Only use image 1 or image 2.

```
U-Boot 2009.01-mlnx1.4 (<date>)
```

```
CPU:  AMCC PowerPC 460EX Rev. A at 1000 MHz (PLB=200, OPB=100, EBC=100 MHz)
```

```
Security/Kasumi support
```

```
Bootstrap Option H - Boot ROM Location I2C (Addr 0x52)
```

```
Internal PCI arbiter disabled
```

```
32 kB I-Cache 32 kB D-Cache
```

```
Board: Mellanox PPC460EX Board
```

```
FDEF:  No
```

```
I2C:   ready
```

```
DRAM:  2 GB (ECC enabled, 400 MHz, CL3)
```

```
FLASH: 16 MB
```

```
NAND:  1024 MiB
```

```
PCI:   Bus Dev VenId DevId Class Int
```

```
PCIE0: link is not up.
```

```
PCIE1: successfully set as root-complex
```

```
01 00 15b3 bd34 0c06 00
```

```
Net:   ppc_4xx_eth0, ppc_4xx_eth1
```

```
Hit Ctrl+B to stop autoboot:  0
```

```
Mellanox MLNX-OS
```

```
Boot Menu:
```

```
1. SX_PPC_M460EX 3.2.0000-dev-HA 2013-04-10 12:02:49 ppc
```

```
2. SX_PPC_M460EX 3.2.0000-dev-HA 2013-04-11 14:05:39 ppc
3. U-Boot prompt
Choice:
```

5. Select the image to boot.

Appendix A: Specification

Table 14 - SX1024 Specification Data

Physical		
Size /Weight	Size: SX1024B (short) 1U 1.716" H x 16.85" W x 15.9" D 43.6 mm X 428 mm X 403.4 mm IdataPLX	Weight: Short: 7.01 kg 1 PS unit 7.75 kg 2 PS units
Mounting	Mounting: 19" Rack mount	
SerDes Speeds / Connector Types	SerDes Speeds: 10 or 1Gb/s per port	Connector Types: QSFP Can use QSFP to SFP+ adapter modules
Air Flow/ Heat dissipation	Air Flow: 34.62 CFM	Heat dissipation: Maximum 912.24 BTUs/hr
Power and Environmental		
Input Voltage / Management CPU	Input Voltage: 100 - 240 VAC 50-60 Hz	Management CPU: PowerPC 460EX CPU
Power numbers	Power Consumption: PS unit fan is always at 70%	Typ: 40 GbE Passive cables: 152W Active Cables: 218W Optical cables: 221W
	Max: 40GbE Passive cables: 175 W Active Cables: 263 W Optical cables: 267 W	SFP+ MAX 1.5 W TYP: 1.0 W
Cable power / Temperature	QSFP MAX 2.0 W TYP: 1.5 W	Temperature: Operating 0° to 45° Celsius Non-operating -40° to 70° Celsius
Shock and Vibration/ Humidity	Shock and Vibration: ETSI EN 300 019-2-2: 1999-09	Humidity: Operating 5% - 95% non-condensing

Table 14 - SX1024 Specification Data

Protocol Support		
Speed protocol \ QoS / Management	Ethernet: Default 10Gb/s, must be manually configured to 1Gb/s through the GUI or the CLI.	Management: Managed using MLNX-OS
Data Rate	Data Rate: 10Gb/s	
Regulatory Compliance		
Safety \ EMC (Emissions)	Safety: US/Canada: cTUVus EU: IEC60950 International: CB	EMC (Emissions): USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A
Environmental / Acoustic	Environmental: EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test	Acoustic: ISO 7779 ETS 300 753
Scalability and Performance		
Switching Performance / Capacity	Switching Performance: Simultaneous wire-speed any port to any port	Switching Capacity: 2.30Tb/s
Reliability, Availability and Serviceability Features		
Hot swapability / Redundancy	Hot-Swappable: Fan Module 1+1 Redundant: Power Supplies	

A.1 Approved Cables

For a list of all approved cables see:

http://www.mellanox.com/related-docs/user_manuals/Mellanox_approved_cables.pdf

A.2 EMC Certifications

The list of approved certifications per switch in different regions of the world is located on the Mellanox Website at:

http://www.mellanox.com/related-docs/user_manuals/Regulatory_and_Compliance_Guide.pdf

EMC statements are also in the Regulatory and Compliance Guide.

 China-CCC Warning statements

 For non tropical use:

安全 说明 和标 记	汉文	“仅适用于非热带气候条件下安全使用。”
	藏文	《འགྲོ་བཤུ་དང་། ཅ་མཚེན་རྒྱལ་ཁོངས་ཀྱི་འཕྲོད་ཆུང་གི་འཕྲོད་ཆུང་གི་ཐོག་ནས་འཕྲོད་ཆུང་།》
	蒙古文	“ “ಹೆವದಿ”ಸುಖಾಪ್ರೀತಿಯನ್ನು ತರುವುದು, ಹೆವದಿ”ನಿಂದ ಸುಖಾಪ್ರೀತಿಯನ್ನು ತರುವುದು, ಹೆವದಿ”ನಿಂದ ಸುಖಾಪ್ರೀತಿಯನ್ನು ತರುವುದು. ”
	壮文	Dan hab yungh youq gij dienheiq diuzgen mbouj dwg diegndat haenx ancienz sawjyungh.
	维文	غەيرى ئىسسىق بەلباغ ھازا كىلىماتى شارائىتىدىلا بىخەتەر ئىشلەتكىلى بولىدۇ

 For altitude 2000 meter and below:

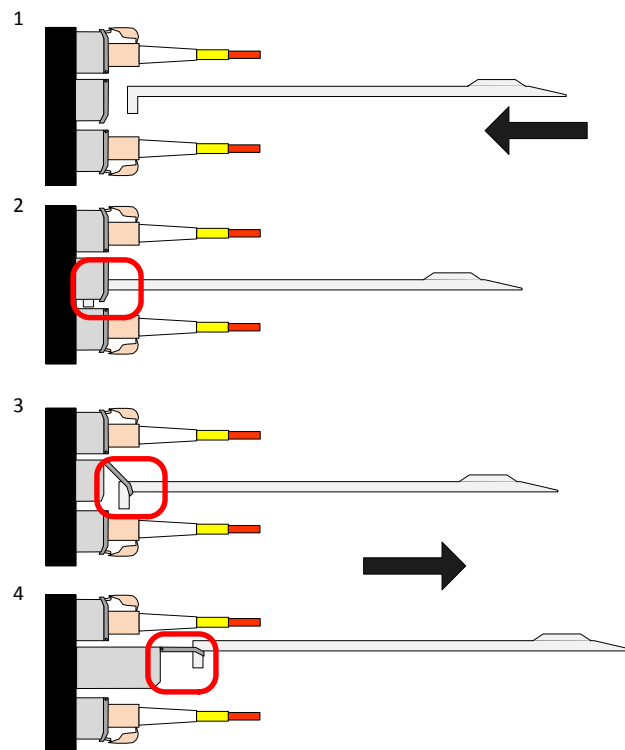
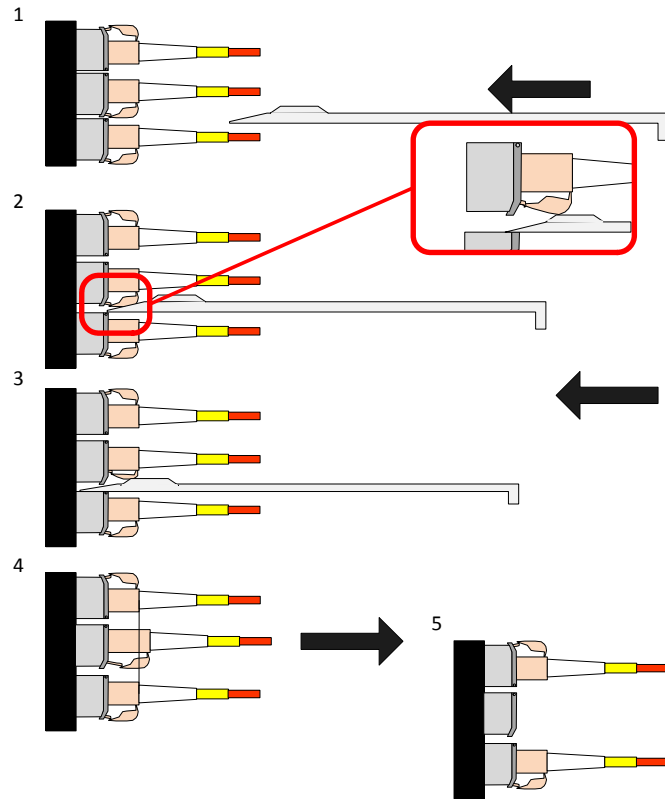
安全 说明 和标 记	汉文	仅适用于海拔2000m以下地区安全使用。
	藏文	《2000m རྒྱུ་རྐྱེད་ཀྱི་འགན་ཁུར་གྱི་སྡེ་ལོ་མཉམ་པོ་ལྟ་བུ་ཞིག་ལྟར་ཆེན་པོ་ལྟར་འཇགས།》
	蒙古文	“ Бүтээхийн дэвсгэрийн хамрах хүрээ 2000м-ийг багасгахгүй байхыг анхааруулж байна. ”
	壮文	Dan hab yungh youq gij digih haijbaz 2000m doxroengz haenx ancienz sawjyung.
	维文	دېڭىز يۈزىدىن 2000 مېتر تۆۋەن رايونلار دىلا بىخەتەر ئىشلەتكىلى بولىدۇ

声明

此为 A 级产品, 在生活环境中, 该产品可能会造成无线干扰。在这种情况下, 可能需要用户对其干扰采取切实可行的措施。

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Appendix B: SFP+ Removal Tool Instructions

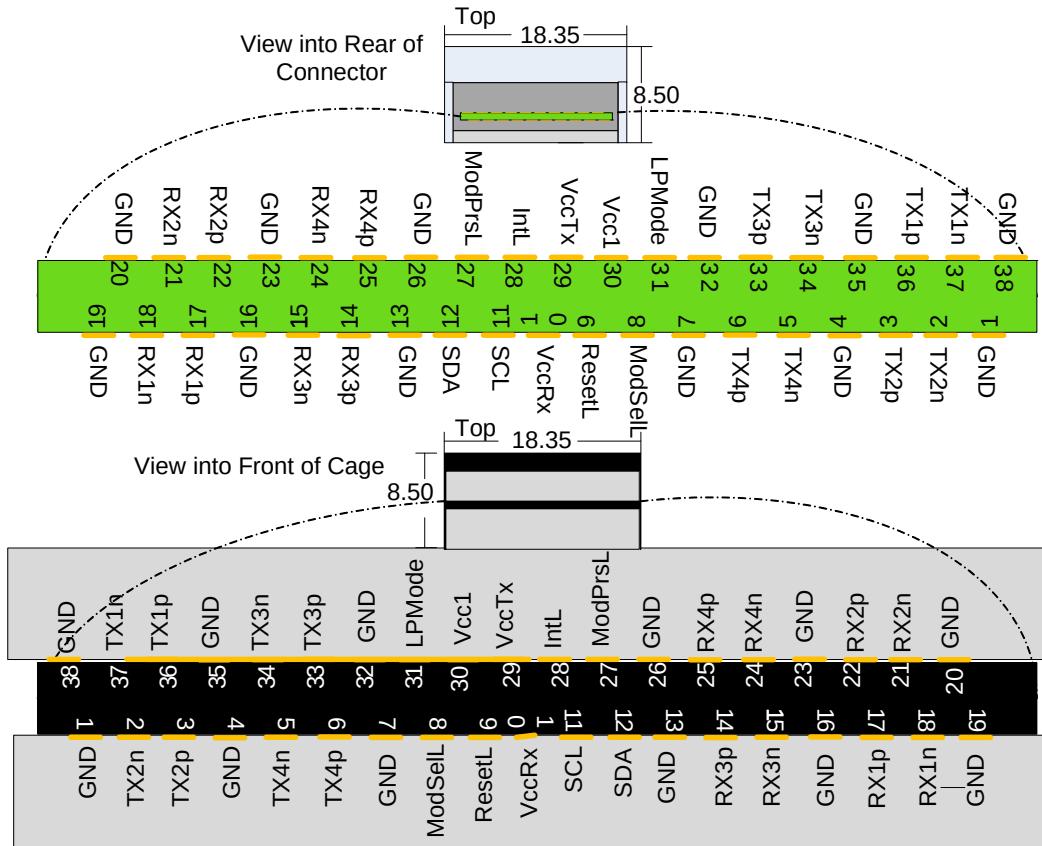


Appendix C: QSFP Interface

J3 and J6

20	GND	GND	19
21	Rx2n	Rx1n	18
22	Rx2p	Rx1p	17
23	GND	GND	16
24	Rx4n	Rx3n	15
25	Rx4p	Rx3p	14
26	GND	GND	13
27	ModPrsL	SDA	12
28	IntL	SCL	11
29	VccTx	Vcc Rx	10
30	Vcc1	ResetL	9
31	LPMode	ModSelL	8
32	GND	GND	7
33	Tx3p	Tx4p	6
34	Tx3n	Tx4n	5
35	GND	GND	4
36	Tx1p	Tx2p	3
37	Tx1n	Tx2n	2
38	GND	GND	1

Connector Pin Number	Connector Pin Name	Signal Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3 V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Receiver Inverted Data Output
19	GND	Ground
20	GND	Ground
21	Rx2n	Receiver Inverted Data Output 3
22	Rx2p	Receiver Non-Inverted Data Output 3
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output 3
25	Rx4p	Receiver Non-Inverted Data Output 3
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3 V Power supply transmitter
30	Vcc 1	+3.3 V Power Supply
31	LPMode	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground

Figure 35: QSFP Connector Male and Female Views

Appendix D: SFP+ Interface

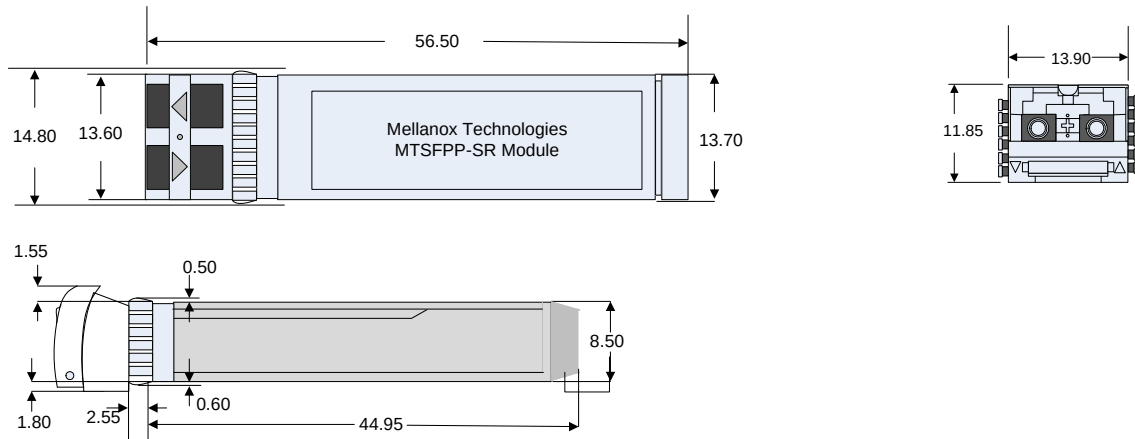
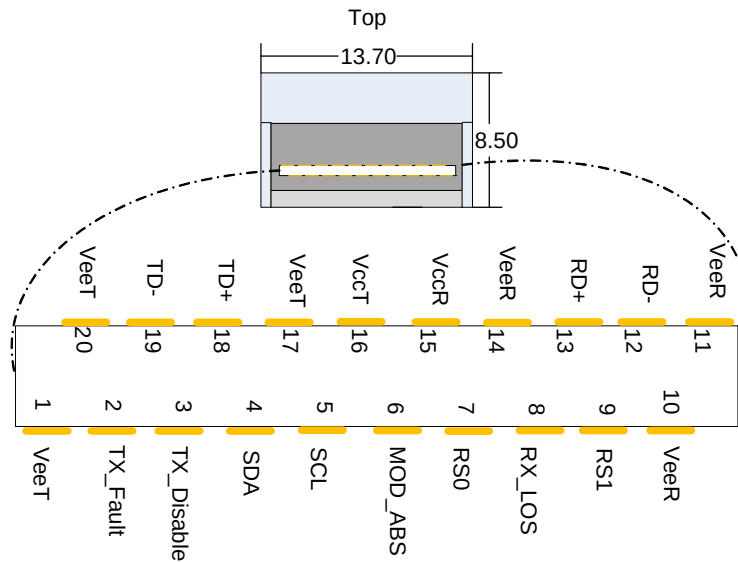


Figure 36: Rear View of Module With Pin Placement



Pin	Symbol Name	Description
1	VeeT	Transmitter Ground (Common with Receiver Ground) ^a
2	TX_Fault	Transmitter Fault. ^b
3	TX_Disable	Transmitter Disable. Laser output disabled on high or open. ^c

Pin	Symbol Name	Description
4	SDA	2-wire Serial Interface Data Line ^d
5	SCL	2-wire Serial Interface Clock Line ^d
6	MOD_ABS	Module Absent. Grounded within the module ^d
7	RS0	No connection required
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation. ^e
9	RS1	No connection required
10	VeeR	Receiver Ground (Common with Transmitter Ground) ^a
11	VeeR	Receiver Ground (Common with Transmitter Ground) ^a
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver Non-inverted DATA out. AC Coupled
14	VeeR	Receiver Ground (Common with Transmitter Ground) ^a
15	VccR	Receiver Power Supply
16	VccT	Transmitter Power Supply
17	VeeT	Transmitter Ground (Common with Receiver Ground) ^a
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.
19	TD-	Transmitter Inverted DATA in. AC Coupled.
20	VeeT	Transmitter Ground (Common with Receiver Ground) ^a

- a. Circuit ground is internally isolated from chassis ground.
- b. T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
- c. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V
- d. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- e. LOS is open collector output. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Appendix E: RJ-45 CONSOLE and I2C Interface

The RJ-45 CONSOLE and I2C interface uses the EIA 568A standard wiring color coding.

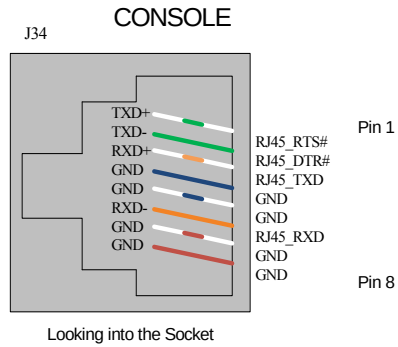


Table 15 - RJ-45 CONSOLE Pinout

Connection	Signal	Pin#	Color
TXD+	RJ-45_RTS#	1	G/W
TXD-	RJ-45_DTR#	2	G
RXD+	RJ-45_TXD	3	O/W
GND	GND	4	Bl
GND	GND	5	Bl/W
RXD-	RJ-45_RXD	6	O
GND	GND	7	Br/W
GND	GND	8	Br

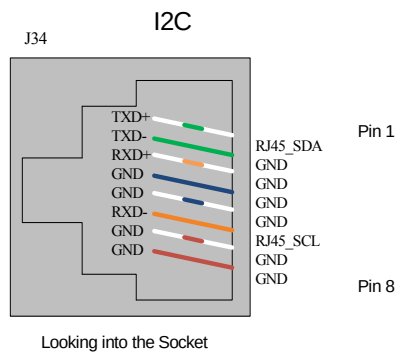


Table 16 - RJ-45 I2C Pinout

Connection	Signal	Pin#	Color
TXD+	RJ-45_SDA	1	G/W
TXD-	GND	2	G
RXD+	GND	3	O/W
GND	GND	4	Bl
GND	GND	5	Bl/W
RXD-	RJ-45_SCL	6	O
GND	GND	7	Br/W
GND	GND	8	Br

Appendix F: Accessory and Replacement Parts

Table 17 - OPNs for Replacement Parts

Part Description	OPN
I2C DB9 or RJ-45 to USB Adapter	MTUSB-1
Fan module with power supply side to connector side air flow	MSX62-FF
Fan module with connector side to power supply side air flow	MSX62-FR
300W Power Supply w/ Power Supply Side to Connector side air flow	MSX60-PF
300W Power Supply w/ Connector side to Power Supply side air flow	MSX60-PR
Power cord Type C13-C14	ACC000500
Installation Kit for short switches in racks 40-60 cm deep	MSX60-BKIT
Installation Kit for short or standard switches in racks 60-80 cm deep	MSX60-SKIT

Appendix G: Avertissements de sécurité d'installation (French)

1. Instructions d'installation



Lisez toutes les instructions d'installation avant de brancher le matériel à la source d'alimentation électrique.

2. Température excessive



Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 45°C (113°F). Un flux d'air de 200LFM à cette température ambiante maximale est nécessaire. En outre, pour garantir un bon écoulement de l'air, laissez au moins 8 cm (3 pouces) d'espace libre autour des ouvertures de ventilation.

3. Empilage du châssis



Le châssis ne doit pas être empilé sur un autre matériel. Si le châssis tombe, il peut provoquer des blessures corporelles et des dégradations de biens.

4. Connection d'Alimentation électrique excédentaire -dangers électriques



Ce produit comporte un couvercle transparent sur l'espace pour l'alimentation électrique redondante.

Ne pas faire fonctionner le produit si le couvercle transparent n'est pas solidement fixé ou s'il est enlevé.

5. Système de fusible neutre/à double pôle



Avertissement: Système de fusible neutre/à double pôle. Veuillez débrancher tous les cordons d'alimentation avant d'ouvrir le boîtier de ce produit ou de toucher un de ses composants internes.

6. Orages – dangers électriques



Pendant un orage, il ne faut pas utiliser le matériel et il ne faut pas brancher ou débrancher les câbles.

7. Branchement/débranchement des câbles en cuivre



Les câbles InfiniBand en cuivre sont lourds et ne sont pas flexibles, il faut donc faire très attention en les branchant et en les débranchant des connecteurs. Consultez le fabricant des câbles pour connaître les mises en garde et les instructions spéciales.

8. Risque de choc et de danger



Risque de choc et de danger électriques. Le débranchement d'une seule alimentation stabilisée ne débranchera uniquement qu'un module "Alimentation Stabilisée". Pour isoler complètement le module en cause, il faut débrancher toutes les alimentations stabilisées.



Risk of electric shock and energy hazard.
The PSUs are all independent.
Disconnect all power supplies to ensure a powered down state inside of the switch platform.

9. Montage et entretien sur baie



Lorsque ce produit est monté ou entretenu sur baie, il faut prendre des précautions spéciales pour s'assurer que le système reste stable. En général, il faut remplir la baie avec du matériel de bas en haut.

10. Fuite > 3.5mA Leakage > 3.5mA



« ATTENTION – La connexion à la terre des forts courants de fuite est essentielle avant le branchement de l'alimentation. »
Avant de brancher l'appareil à la conduite d'alimentation, les vis de protection à la terre du terminal de l'appareil doivent être appliquées à l'installation de protection à la Terre du bâtiment.

11. Danger d'explosion de la Batterie



Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

12. Forts Courants de Fuite High Leakage Current



Attention: Forts courants de fuite. Il est essentiel de relier à la terre avant de brancher l'alimentation.

13. Ajouter une information de connexion à la masse Connect a Valid Ground to this Device



Avant de brancher l'appareil à la conduite d'alimentation, les vis de protection à la terre du terminal de l'appareil doivent être appliquées à l'installation de protection à la Terre du bâtiment.

14. Installation du matériel



Ce matériel ne doit être installé, remplacé ou entretenu que par du personnel formé et qualifié.

15. Elimination du matériel



L'élimination de ce matériel doit s'effectuer dans le respect de toutes les législations et réglementations nationales en vigueur.

16. Codes électriques locaux et nationaux



Ce matériel doit être installé dans le respect des codes électriques locaux et nationaux.

17. Codes d'installation



L'appareil doit être installé selon l'ancienne version des codes électriques nationaux du pays. Pour l'Amérique du Nord, l'équipement doit être installé conformément aux spécifications du Code Electrique National Américain et du Code Electrique Canadien.

18. Interconnexion des unités



Les câbles de branchement à l'unité RS232 et les interfaces Ethernet doivent être certifiés UL de type DP-1 ou DP-2. (Note - lorsqu'il existe dans un circuit non LPS)

Protection contre la surintensité : Un appareil de protection répertorié facilement accessible contre la surintensité du circuit de branchement et calibré à 20A doit être incorporé dans le câblage électrique du bâtiment.

19. Exposition au rayonnement grave



Mise en garde – l'utilisation de commandes ou de réglages ou l'exécution de procédures autres que ce qui est spécifié dans les présentes peut engendrer une exposition au rayonnement grave.



PRODUIT LASER DE CLASSE 1 » et références aux normes laser les plus récentes CEI 60 825-1:1993 + A1:1997 + A2:2001 et NE 60825-1:1994+A1:1996+ A2:2001

20. S'assurer que les enceintes sont appropriées



Des enceintes électriques, mécaniques et incendie adaptées doivent être fournies par le fabricant du produit final ou par l'utilisateur final.

21. Cordons électriques CA homologués UL



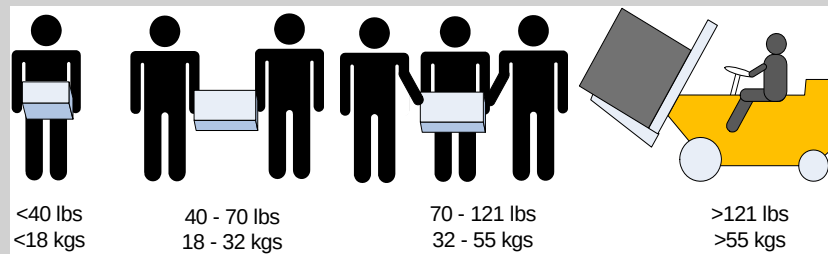
Pour les prises électriques en Amérique du Nord, choisissez un cordon électrique homologué UL et certifié CSA

à 3 conducteurs, [18 AWG], terminé par une fiche moulée, d'une tension nominale de 125 V, [15 A], avec une longueur minimale de 1,5 m [6 pieds] et d'une longueur maximale de 4,5 m [18 pieds]

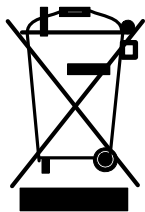
Pour les prises électriques en Europe, choisissez un cordon électrique harmonisé internationalement et marqué "<HAR>",

à 3 conducteurs, d'un diamètre de fil minimum de 0,75 mm², d'une tension nominale de 300 V, avec une gaine isolée en PVC. Le cordon doit avoir une fiche moulée d'une tension nominale de 250 V et d'une intensité nominale de 10 A.

22.



23. Conformément à la Directive WEEE



Conformément à la Directive WEEE 2002/96/EC, les déchets d'équipements électriques et électroniques (EEE) doivent être triés et ne peuvent être éliminés avec les déchets ménagers.

Veuillez disposer de ce produit et de tous ses composants de manière responsable et respectueuse de l'environnement.

Appendix H: Installation - Sicherheitshinweise (German)

1. Installationsanleitungen



Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

2. Übertemperatur



Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 45°C (113°F) betrieben werden. Es ist ein Luftstrom von 200 LFM bei maximaler Umgebungstemperatur erforderlich. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

3. Stapeln des Chassis



Das Chassis sollte nicht auf andere Geräte gestapelt werden. Wenn das Chassis herunterfällt, kann es zu Verletzungen und Beschädigungen an Geräten führen.

4. Redundanter Stromversorgungsanschluss - Elektrische Gefahr



Dieses Produkt verfügt über eine Abdeckung über dem Bereich für die redundante Stromversorgung. Betreiben Sie das Produkt nicht, wenn diese Abdeckung nicht sicher fest sitzt oder entfernt wurde.

5. Bei Gewitter - Elektrische Gefahr



Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät, schließen Sie keine Kabel an oder ab.

6. Anschließen/Trennen von Kupferkabel



Kupferkabel sind schwer und nicht flexible. Deshalb müssen sie vorsichtig an die Anschlüsse angebracht bzw. davon getrennt werden. Lesen Sie die speziellen Warnungen und Anleitungen des Kabelherstellers.

7. Gefahr des elektrischen Schocks.



Gefahr des elektrischen Schocks. Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen sind die Netzstecker aller Netzteile zu entfernen



Risk of electric shock and energy hazard.

The PSUs are all independent.

Disconnect all power supplies to ensure a powered down state inside of the switch platform.

8. Rack-Montage und Wartung



Wenn dieses Produkt in einem Rack montiert oder gewartet wird, sind besondere Vorichtsmaßnahmen zu ergreifen, um die Stabilität des Systems zu gewährleisten. Im Allgemeinen sollten Sie das Gestell von unten nach oben mit Geräten füllen.

9. Geräteinstallation



Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

10. Geräteentsorgung



Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

11. Regionale und nationale elektrische Bestimmungen



Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.

12. Richtigen Schutz sicherstellen



Geeigneter elektrischer, mechanischer und Feuerschutz sind vom Hersteller des Endprodukts oder dem Endbenutzer bereitzustellen.

13. Strahlenkontakt



Achtung – Nutzung von Steuerungen oder Einstellungen oder Ausführung von Prozeduren, die hier nicht spezifiziert sind, kann zu gefährlichem Strahlenkontakt führen..



Klasse 1 Laserprodukt und Referenzen zu den aktuellsten Lasterstandards :
ICE 60 825-1:1993 + A1:1997 + A2:2001 und EN 60825-1:1994+A1:1996+ A2:2001

14. UL-und CSA Certified Netzkabel



Für Nordamerika Stromanschluss, wählen Sie ein Netzkabel, das UL-und CSA Certified

3 - Leiter, [18 AWG], mit einem angespritztem Stecker bewertet bei 125 V, [15], mit einer Mindestlänge von 1,5 m [Six Feet] aber nicht mehr als 4,5 m.

Für die europäischen Zusammenhang, wählen Sie ein Netzkabel, das international harmonisiert und der Aufschrift "<HAR>",

3 - Leiter, mindestens 0,75 mm² Draht, bewertet mit 300 V, mit einem PVC-Mantel isoliert. Das Kabel muss eine angespritztem Stecker bewertet bei 250 V, 10 A. "

15. Ableitstrom > 3.5mA LEAKAGE >3.5mA



WARNUNG: Hohe Ableitstrom; Earth Verbindung, bevor Sie die Verbindung von wesentlicher Bedeutung werden.

16. Add GND Verbindung Informationen



Bevor Sie dieses Gerät an das Stromnetz, die Schutzerde Terminal Schrauben dieses Gerät muss an den Schutzleiter in der Gebäudeinstallation.

17. Installation Codes



Dieses Gerät muss installiert sein, entsprechend auf die neueste Version des Landes National Electrical Code. Für Nordamerika, müssen in Übereinstimmung mit den geltenden Vorschriften in der US-amerikanischen National Electrical Code und dem Canadian Electrical Code.

18. Zusammenschaltung von EINHEITEN



Kabel für den Anschluss an das Gerät RS232-und Ethernet-Schnittstellen müssen UL zertifiziert Typ DP-1 oder DP-2. (Hinweis-, wenn nicht mit Wohnsitz in LPS-Schaltung)

Überstromschutz: Eine leicht zugängliche Auflistung Abzweigleitung Überstrom-Schutzeinrichtung 20 A bewertet werden müssen in dem Gebäude Verkabelung.

19. Zweipolige bzw. Neutraleiter-Sicherung im Netzteil



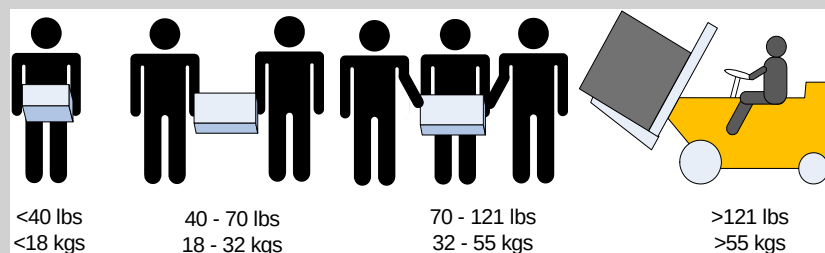
Achtung:

Zweipolige bzw. Neutraleiter-Sicherung im Netzteil. Netzstecker ziehen, um sicherzustellen, daß keine Spannung am Gerät anliegt. Entfernen Sie alle Netzkabel vor dem Öffnen der Abdeckung dieses Produkts oder dem Berühren der Innenteile.

20. Bodily Injury Due to Weight



Use enough people to safely lift this product.



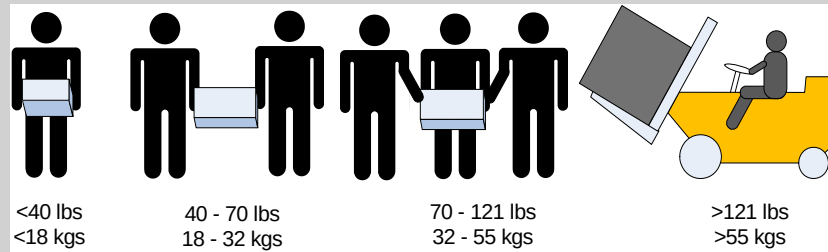
Appendix I: Advertencias de seguridad para la instalación (Spanish)

1. Instrucciones de instalación



Antes de conectar el equipo a la fuente de alimentación, leer todas las instrucciones de instalación.

2. Lesión corporal por peso



3. Lesión corporal por peso



This equipment is very heavy and should be moved using a mechanical lift to avoid injuries.

4. Sobre calentamiento



No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 45°C. Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

5. Apilamiento del chasis



Los chasis no se deben apilar sobre otros equipos. La caída del chasis podría causar lesiones corporales, así como daños al equipo.

6. Dos fusibles, uno en el polo y otro en el neutro



Dos fusibles, uno en el polo y otro en el neutro. Quitar los cables de corriente antes de abrir la tapa de este producto o tocar cualquier componente interno.

7. Cuando hay rayos: peligro de descarga eléctrica



No utilizar el equipo ni conectar o desconectar cables durante períodos de actividad de rayos.

8. Conexión y desconexión del cable Copper



Dado que los cables de cobre son pesados y no son flexibles, su conexión a los conectores y su desconexión se deben efectuar con mucho cuidado. Para ver advertencias o instrucciones especiales, consultar al fabricante del cable.

9. Montaje y mantenimiento de bastidores



Al instalar o realizar el mantenimiento de este aparato en un bastidor, es preciso adoptar precauciones especiales para garantizar que el sistema se mantenga estable. En general, en un bastidor, los equipos se deben instalar comenzando desde abajo hacia arriba.

10. Instalación de equipos



La instalación, el reemplazo y el mantenimiento de este equipo estarán a cargo únicamente de personal capacitado y competente.

11. Asegurar confinamientos adecuados



El fabricante del producto final o el usuario final deberán suministrar un confinamiento adecuado para componentes eléctricos y mecánicos y contra incendio.

12. Eliminación de equipos



La eliminación definitiva de este equipo se debe efectuar conforme a todas las leyes y reglamentaciones nacionales.

13. Códigos eléctricos locales y nacionales



Este equipo se debe instalar conforme a los códigos eléctricos locales y nacionales.

14. Cable de alimentación homologado por UL y con certificación CSA



En conexiones de América del Norte, seleccionar un cable de alimentación homologado por UL y con certificación CSA de tres conductores, [16 AWG], terminado en un enchufe moldeado con capuchón de 125 voltios nominal, [13 A], con una longitud mínima de 1,5 metros, pero no más de 4,5 metros.

En conexiones europeas, seleccionar un cable de alimentación armonizado internacionalmente y marcado "<HAR>", de tres conductores, hilo de 1,0 mm² como mínimo, 300 voltios nominal, con cobertura protectora aislante de PVC. El cable debe tener un enchufe moldeado con capuchón de 250 voltios nominal, 10 A.

15. Añadir conexión a tierra



Antes de conectar el dispositivo a la línea de alimentación, los tornillos del terminal de la puesta a tierra de protección del dispositivo se deben conectar a la puesta a tierra de protección de la instalación del edificio.

(Información de conexión a tierra):

La instalación del edificio deberá proveer un medio para la conexión con la puesta a tierra de protección y un técnico de servicio deberá conectar permanentemente el equipo a dicho medio de conexión.

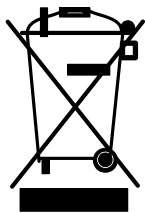
Un TÉCNICO DE SERVICIO comprobará si la toma eléctrica de la que se suministrará corriente al equipo provee una conexión con la puesta a tierra de protección del edificio. De no ser así, el TÉCNICO DE SERVICIO se encargará de instalar un CONDUCTOR DE CONEXIÓN A TIERRA DE PROTECCIÓN, del terminal de puesta a tierra de protección separado al conductor de tierra de protección del edificio. El equipo se instalará en un área donde haya conexión equipotencial, como por ejemplo, un centro de telecomunicaciones o una sala de computadoras dedicada.

16. Códigos de instalación



Este dispositivo se debe instalar conforme a la versión más reciente de los códigos eléctricos nacionales del país en cuestión. En América del Norte, el equipo se debe instalar de acuerdo con las disposiciones vigentes del Código Eléctrico Nacional de los EE.UU. y del Código Eléctrico de Canadá.

17. Directiva sobre RAEE



Conforme a la Directiva 2002/96/CE sobre RAEE, todos los residuos de equipos eléctricos y electrónicos (EEE) se deben recolectar por separado y no se deben eliminar junto con residuos domésticos.

Al deshacerse de este producto y de todas sus partes, hágalo de una manera responsable y respetuosa con el medio ambiente.